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ALEYRODIDAE OF FORMOSA

PART I

BY

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CONTENTS

PAGES

Introduction. 1

Food plant catalogue of the Formosan Aleyrodidae ... 2

List of the Formosan Aleyrodidae, with descriptions of new species. 7

Bibliography. 50

摘要 53

驅除豫防法 54

Index. 56

ALEYRODIDAE OF FORMOSA. I.

By

Ryoichi TAKAHASHI

Introduction.

The whiteflies or Aleyrodidae, which form the subject of this paper, are a group of hemipterous insects much neglec d and very imperfectly known in the Oriental Region. They, however, include many species attacking cultivated plants and also some known to transmit virus diseases of plants; and the study of these insects is of considerable importance and interest both from the economic and biological standpoints.

Very little has as yet been done toward the study of these insects in Formosa. S. Matsumura (1910), I. Kuwana (1911) and F. Silvestri (1927) have recorded 4 species [1] from the island, while T. Shiraki (1912, 1913), M. Maki (1915, 1916) and the late I. Nitobe (1916) have described several undetermined or misidentified species injurious to various cultivated plants, and in 1931 I recorded 15 species of the family, of which 11 were new to science.

In the present paper 60 species [2] now known to occur in Formosa are dealt with, a large proportion of which are new to science as is to be expected and a species represents a new subfamily. They have been collected for the most part in the northern part of the island, and many forms attacking various plants will be discovered with further exploring, which I hope to carry out in the future. The Formosan species are much more in number than we have supposed, which indicates that a large number of these insects remain unstudied in the Asian Tropics.

Unfortunately most species of this family are as yet known from the last larval instar only, and the present study has been entirely based upon the structures of that stage.

(1) *Neomaskellia bergii* Signt., *Aleurocanthus spinosus* Kuw., *A. spiniferus* Quaint. and *Aleurolobus marlatti* Quaint. *A. spinosus* Kuw. was redescribed by Quaintance and Baker in 1917.

(2) A few species represented by unsatisfactory material in our collection will remain excluded in this paper. They are a species of the Aleurodicinae on Machilus, *Bemisia* sp. on Hibiscus, *Aleurocanthus* sp. on Bladhia, etc.

The species here treated have been collected by me unless otherwise stated. The type specimens will be preserved in the Department of Agriculture, Government Research Institute, Formosa.

I express here my sincere thanks to Prof. T. Shiraki for his kind help in my study.

Food plant catalogue of the Formosan Aleyrodidae.

At present some 65 species of plants belonging to 53 genera are known to be attacked by these insects in Formosa, which are here arranged alphabetically.

These plants are for the most part evergreen trees, and among them *Machilus* is fed upon by most species.

The host plants have been identified by Messrs. S. Sasaki, J. Suzuki, Prof. Y. Yamamoto, and others.

Acer sp. (Aceraceae).

Bemisia aceri Takah.

Actinodaphne pedicellata (Lauraceae).

Aleurodicus machili Takah.

Agalma lutchuense (Araliaceae).

Aleurotuberculatus gordoniae Takah.

Alnus formosana (Betulaceae).

Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et Baker.

Bischofia javanica (Euphorbiaceae).

Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et Baker.

Dialeurodes (Dialeurodes) citri Ashm.

Bladhia sieboldii (Myrsinaceae).

Aleurolobus philippinensis Quaint. et Baker.

Dialeurodes (Dialeurodes) citri Ashm.

Dialeurodes (Dialeuroplata) bladhiae Takah.

Bridelia ovata (Euphorbiaceae).

Aleurotuberculatus psidii Singh.

Dialeurodes (Dialeuropora) bridhliae Takah.

Dialeurodes (Singhius) hibisci Kotin.

Callicarpa formosana (Verbenaceae).

Acanthaleyrodes callicarpae Takah.

Celtis sinensis (Ulmaceae).

Aleurotrachelus caerulescens Singh.

Dialeurodes (Rachisphora) fici Takah.

Dialeurodes (Singhius) hibisci Kotin.

Pealius celti Takah.

Cinnamomum camphora (Lauraceae).

Aleurocanthus cinnamomi Takah.

Aleurotuberculatus gordoniae Takah.

A. psidii Singh.

Dialeurodes (Singhius) hibisci Kotin.

Cinnamomum japonicum.

Aleurotuberculatus gordoniae Takah.

Aleyrodes cinnamomi Takah.

Dialeurodes (Gigaleurodes) cinnamomi Takah.

Cinnamomum reticulatum.

Siphonaleyrodes formosanus Takah.

Citrus spp. (Rutaceae).

Aleurocanthus spiniferus Quaint.

A. spinosus Kuw.

Aleurolobus citri Takah.

A. marlatti Quaint.

Bemisia giffardi Kotin.

Dialeurodes (Dialeurodes) citri Ashm.

Clerodendron sp. (Verbenaceae).

Aleurotuberculatus uraianus Takah.

Crotalaria sp. (Leguminosae).

Bemisia achyranthes Singh.

Daphniphyllum glaucescens (Euphorbiaceae).

Dialeurodes (Dialeurodes) daphniphylli Takah.

Dialeurodes (Gigaleurodes) multipori Takah.

Taiwanaleyrodes meliosmae Takah.

Elatostema lineolatum (Urticaceae).

Aleurotrachelus elatostemae Takah.

Elatostema sp.

Aleurotuberculatus elatostemae Takah.

Trialeurodes elatostemae Takah.

Euphorbia longana (Sapindaceae).

Aleurotuberculatus psidii Singh.

Fagara ailanthoides (Rutaceae).

Dialeurodes (Rachisphora) fici Takah.

Fagara nitida.

Aleurocanthus spiniferus Quaint.

Ficus beecheyana (Moraceae),

Pealius longispinus Takah.

Ficus retusa.

Aleuroplatus (Aleuroplatus) fici Takah.

Aleurotuberculatus gordoniae Takah.

Ficus sp.

Aleurotuberculatus ficicola Takah.

Setaleyrodes mirabilis Takah.

Ficus vasculosa.

Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et Baker.

Dialeurodes (Rachisphora) fici Takah.

Fissistigma oldhami (Anonaceae).

Aleurotrachelus fissistigmae Takah.

Gardenia florida (Rubiaceae).

Aleurocanthus spinosus Kuw.

Aleurolobus philippinensis Quaint. et Baker.

Aleurotrachelus caerulescens Singh.

Aleyrodes kuchinasii Sasaki.

Dialeurodes (Dialeurodes) citri Ashm.

Glochidion spp. (Euphorbiaceae).

Dialeurodes (Dialeurodes) citri Ashm.

Dialeurodes (Singhius) hibisci Kotin.

Gordonia anomala (Camelliaceae).

Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et Baker.

Aleurotuberculatus gordoniae Takah.

Gossypium sp. (Malvaceae).

Bemisia gossypiperda Misra et Lamba.

Gramineae (a plant of).

Aleurocybotus setiferus Quaint. et Baker.

Hibiscus rosa-sinensis (Malvaceae).

Dialeurodes (Singhius) hibisci Kotin.

Hiptage madablota (Malpighiaceae).

Dialeurodes (Dialeurodes) citri Ashm.

Jasminum sp. (Oleaceae).

Aleurotuberculatus jasmini Takah.
Dialeurodes (Singhius) hibisci Kotin.

Lagerstroemia indica (Lythraceae).
Aleurotrachelus caerulescens Singh.

Liquidambar formosana (Hamamelidaceae).
Aleurocanthus spiniferus Quaint.
Aleyrodes liquidambari Takah.

Lithocarpus ternaticupula (Fagaceae).
Dialeurodes (Gigaleurodes) lithocarpi Takah.

Macaranga tanarius (Euphorbiaceae).
Dialeurodes (Singhius) hibisci Kotin.

Machilus spp. (Lauraceae).
Aleurocanthus cinnamomi Takah.
Aleurodicus formosanus Takah.
A. machili Takah.
Aleyrodes cinnamomi Takah.
Bemisia myricae Kuw.
Dialeurodes (Dialeurodes) citri Ashm.
Dialeurodes (Dialeuropora) brideliae Takah.
Dialeurodes (Dialeuropora) setigerus Takah.
Dialeurodes (Rachisphora) machili Takah.
Dialeurodes (Singhius) hibisci Kotin.
Taiwanaleyrodes meliosmae Takah.
Tuberaleyrodes machili Takah.

Maesa japonica (Ardiciaceae).
Bemisia myricae Kuw.
Dialeurodes (Rachisphora) maesae Takah.

Maesa sp.
Aleurotuberculatus psidii Singh.

Mallotus sp. (Euphorbiaceae).
Acanthaleyrodes callicarpae Takah.
Aleurotuberculatus malloti Takah.

Meliosma rhoifolia (Sabiaceae).
Dialeurodes (Dialeurodes) tuberculatus Takah.
Taiwanaleyrodes meliosmae Takah.

Michelia sp. (Magnoliaceae).
Aleurotrachelus micheliae Takah.

Morus alba (Moraceae).

Trialeurodes mori Takah.

Morus sp.

Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et Baker.

Murraya spp. (Rutaceae).

Dialeurodes (Dialeuropora) murrayae Takah.

Myrica rubra (Myricaceae).

Aleurotrachelus caerulescens Singh.

Oplismenus compositus (Gramineae).

Aleurolobus oplismeni Takah.

Pachyrrhizus erosus (Leguminosae).

Aleurotrachelus taiwanus Takah.

Phoebe formosana (Lauraceae).

Aleyrodes cinnamomi Takah.

Piper futokadsura (Piperaceae).

Aleurocanthus spinosus Kuw.

Pongamia pinnata (Leguminosae).

Bemisia pongamiae Takah.

Pourthiaea benthamiana (Rosaceae).

Aleurotuberculatus gordoniae Takah.

Psidium guyava (Myrtaceae).

Aleurolobus setigerus Quaint. et Baker.

Aleurotuberculatus guyavae Takah.

A. psidii Singh.

Bemisia myricae Kuw.

Rosa sp. (Rosaceae).

Aleurocanthus spiniferus Quaint.

Saccharum officinarum (Gramineae).

Neomaskellia bergii Signt.

Salix sp. (Salicaceae).

Aleurocanthus spiniferus Quaint.

Aleurolobus philippinensis Quaint. et Baker.

Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et Baker.

Aleurotrachelus caerulescens Singh.

Aleurotuberculatus psidii Singh.

Dialeurodes (Singhius) hibisci Kotin.

Trialeurodes mori Takah.

Sapium sebiferum (Euphorbiaceae).

Dialeurodes (Singhius) hibisci Kotin.

Sloanea dasycarpa (Elaeocarpaceae).

Aleurocanthus spiniferus Quaint.

Turpinia formosana (Staphyleaceae).

Aleurotrachelus turpiniae Takah.

Dialeurodes (Dialeurodes) citri Ashm.

Wendlandia glabrata (Rubiaceae).

Dialeurodes (Dialeurodes) citri Ashm.

List of the Formosan Aleyrodidae, with descriptions of new species.

Subfamily Aleurodicinae.

Aleurodicus machili Takahashi.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 208 (1931).

Hosts.—Machilus spp., Actinodaphne pedicellata.

Hab.—Taihoku, Maruyama, Sozan, Shinten, Kizan near Urai, Taihezan.

Aleurodicus formosanus n. sp.

(Pupa case) Pale in colour. Elongate, elliptic, very slightly constricted on the thorax, with 11 pairs of short normal setae along the margin, which are reaching beyond the margin. Mid-thoracic suture absent; transverse suture and abdominal segments distinct on the median area. Cephalothorax with 2 pairs of large compound pores; each pore with a short stout spine which is slightly swollen on the basal part, pointed, a little reaching beyond the margin of the pore; a pair of very small chitinized parts present on the head, which possess some very short setae. Abdomen lacking large pores, but with a pair of very small rounded chitinized parts on the posterior portion, which are provided with some very short setae. Venter with a pair of long bristles below the vasiform orifice. Margin chitinized, lacking teeth, with markings as shown in the figure, and a pair of short latero-posterior setae. Thoracic tracheal folds not discernible. Vasiform orifice large, wider than long, somewhat narrowed on the distal half, broadly rounded on the hind margin. Operculum short, rectangular, rounded on the lateral margins, nearly straight on the hind margin, filling nearly half the orifice. Lingula very large, stout, constricted on the basal part, setose, reaching beyond the hind margin of the orifice, with 2 pairs of

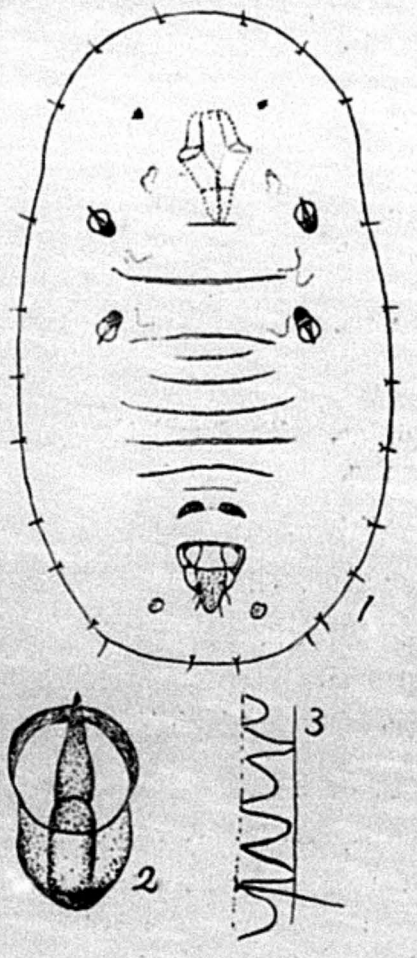


Fig. 1.
Aleurodicus formosanus n. sp.
(Pupa case)
1. Outline. 2. Compound pore on thorax.
3. Marking and seta on marginal area.

setae. Antennae and legs very short, but mouth parts large. Length of pupa case —about 0.8 mm.

Host.—Machilus sp.

Hab.—Taihezan.

Described from specimens taken on May 21, 1931. This species is characterized by possessing 2 pairs of very large pores on the thorax. Near to *A. machili* Takah.

Subfamily Aleyrodinae.

Dialeurodes (Dialeurodes) citri Ashmead.

Aleurodes citri, Ashmead, Florida Dispatch, new ser., XI (1885) (not available); Riley and Howard, Insect Life, V, p. 219 (1893); Quaintance, Genera Insect., 87, p. 5 (1908); Berger, Florida Agr. Expt. St. Bull., no. 97, p. 64 (1909); Kuwana, Insect World, XIV, p. 13 (1910); Pomona Coll. Jl. Ent., III, p. 620 (1911).

Dialeurodes citri, Quaintance and Baker, U. S. Dept. Agr. Bur. Ent. Tech. Ser., no. 27, pt. II, p. 97 (1914); Jl. Agr. Res., VI, p. 459 (1916); Proc. U. S. Nat. Mus., LI, p. 408 (1917); Penny, Jl. Ent. Zool., XIV, p. 21 (1922); Misra, Rept. Proc. 5th Ent. Meet. Pusa, 1923, p. 129 (1924); Silvestri, Boll. Lab. Zool. Portici, XXI, p. 16 (1927); Kuwana and Ishii, Byokin Gaichu Iho, no. 18, p. 19 (1928); Kuwana, Minist. Agr. Forest., Dept. Agr. Sc. Bull., I, no. 1, p. 66 (1928); Singh, Mem. Dept. Agr. India, XII, p. 40 (1931); Takahashi, Trans. Nat. Hist. Soc. Formosa, XXI, p. 203 (1931); Mackie, Mth. Bull. Dept. Agr. Calif., XX, p. 599 (1931).

Hosts.—Citrus spp., Bladhia sieboldii, Gardenia florida, Machilus sp., Hiptage

madablota, Bischofia javanica, Wendlandia glabrata, Glochidion sp., Turpinia formosana.

Hab.—Taihoku, Shirin, Waahoshu, Urai, Taihezan, Heito,

Dialeurodes (Dialeurodes) tuberculatus n. sp.

(Pupa case) Whitish. Broadly elliptic, not constricted, thin. Mid-thoracic suture reaching the margin, transverse suture not so; posterior 2 thoracic segments defined on the median area; abdominal segments somewhat distinct on the median area. Each thoracic segment with a pair of small globular tubercles which are reticulated; the prothoracic tubercles largest; the mesothoracic ones very small, sometimes absent; the metathoracic ones near the anterior margin of the segment, larger than the mesothoracic ones; the 2nd abdominal segment with a pair of similar tubercles as large as those on the metathorax. Dorsum with some minute circular pores sparsely scattered and many lines running from the margin. Margin nearly as in *Dialeurodes citri* Ashm. Thoracic tracheal folds distinct, with many minute dots; the pores located just at the margin, without distinct teeth. Caudal furrow distinct, widened on the basal part, not chitinized on the lateral margins, with many minute dots. Vasiform orifice wider than long, rounded, thickened on the margin, with 6 short teeth and a median small tubercle near the hind end. Operculum wider than long, narrowed posteriorly on the hind half, straight or rounded on the hind margin, nearly filling the orifice. Lingula not exposed. Length of pupa case—about 1.4 mm.

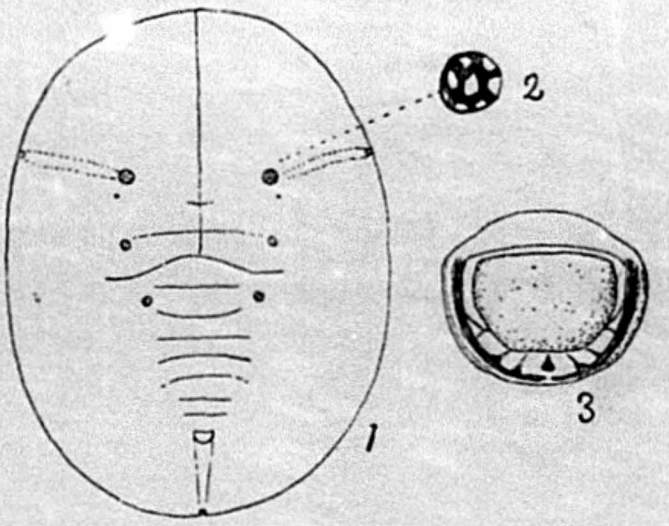


Fig. 2.
Dialeurodes tuberculatus n. sp.
(Pupa case)
1. Outline. 2. Dorsal tubercle. 3. Vasiform orifice.

Host.—Meliosma rhoifolia.

Hab.—Urai.

Described from specimens collected on Sept. 6, 1931. Allied to *Dialeurodes citri* Ashm., differing in the presence of globular dorsal tubercles.

Dialeurodes (Dialeurodes) daphniphylli n. sp.

(Pupa case) White, with no secretion evident. In some specimens cephalothorax dusky on the median area of the posterior part. Subcircular, somewhat longer than wide, not or scarcely constricted across the thoracic tracheal folds, flattened, thin. Mid-thoracic suture reaching the margin; transverse suture not so; abdominal segments discernible on the median area. Dorsum somewhat granular, with some minute circular pores and a pair of short setae near the base of the vasiform orifice. Venter with some small, not-well-developed, circular, pores scattered on the marginal and submarginal areas, which are nearly as large as the opening of the thoracic tracheal fold. Margin with many small, short, rounded teeth which are wider than long; a pair of short setae present on the anterior and posterior margins. Thoracic tracheal folds distinct, with many minute dots; the distal ends opening at the margin of the pupa case, thickened on the margin, with a few very small teeth which are shorter than wide. Caudal furrow distinct, expanded basally, thickened on the basal parts of lateral

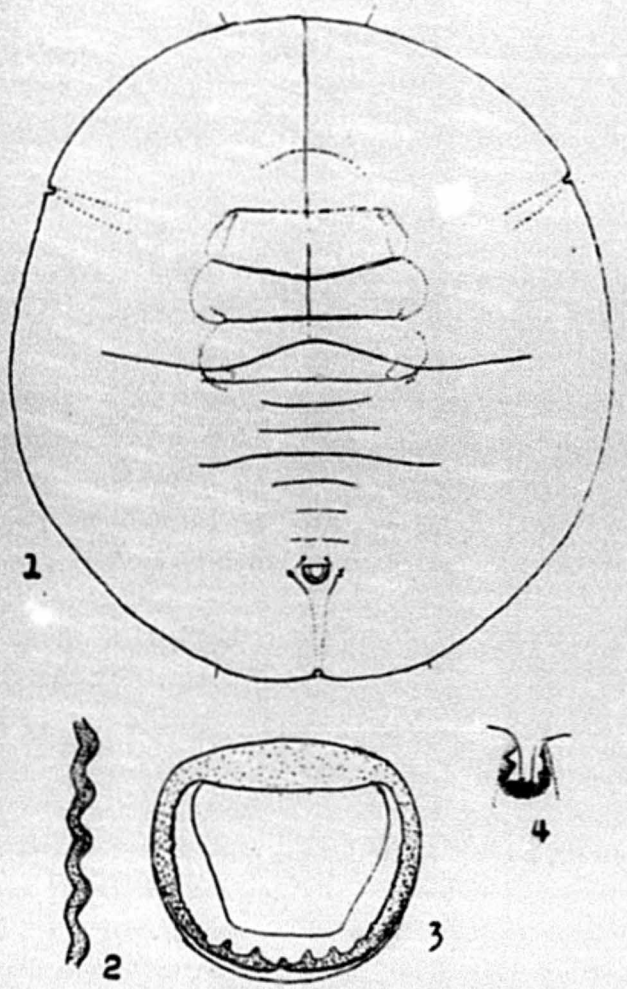


Fig. 3.
Dialeurodes daphniphylli n. sp.
(Pupa case)
1. Outline. 2. Margin. 3. Vasiform orifice.
4. Distal end of thoracic tracheal fold.

margins, with many minute dots, the distal opening with about 5 short teeth which are more or less pointed or rounded apically and wider than long. Vasiform orifice subcircular, wider than long, thickened on the margin, with about 5 distinct teeth on the posterior margin. Operculum wider than long, nearly filling the orifice, sometimes somewhat indented on the hind margin. Lingula not exposed. Length of pupa case—about 1.75mm.

Host.—Daphniphyllum glaucescens, attacking the lower side of leaf.

Hab.—Sozan, Chikushiko.

Described from specimens collected on June 21, 1931. Resembles *Dialeurodes pallida* Singh, but is differentiated from it by the characters of caudal furrow and by the absence of distinct dorsal setae.

Dialeurodes (Gigaleurodes) multipori n. sp.

(Pupa case) White, with no secretion evident. Elliptic, not narrowed anteriorly, not constricted across the thoracic tracheal folds, flattened, thin. Mid-thoracic suture not distinct, reaching the margin; transverse suture not distinct, not reaching the margin; thoracic segments not discernible; abdominal segments not eminent. Dorsum with numerous short papillae scattered, those on the median area of abdomen arranged in transverse rows; 3 pairs of very long rather fine bristles far reaching beyond the margin, which are sometimes very short and capitate; a pair of shorter bristles present near the hind end; a pair of very short setae near the front margin of vasiform orifice; 4 similar setae in a transverse row behind the orifice. Venter with many rather large circular pores as shown in the figure, with no marginal rim. Marginal teeth small, rounded, wider than long; a pair of short setae present on the anterior and posterior margins. Thoracic tracheal folds not distinct, without dots; the distal ends distinct, not forming a pore, without teeth. Caudal furrow distinct, narrow, expanded basally, not thickened on the lateral margins, distinctly thickened and slightly trilobed on the hind end, with many small irregular markings in transverse rows on the basal half; the median lobe on the hind end more narrow than the lateral ones. Vasiform orifice wider than long, somewhat rounded on the lateral margins, a little thickened on the margin, somewhat indented on the hind margin, without teeth. Operculum wider than long, indented on the hind margin, nearly filling the orifice. Lingula a little reaching beyond the hind margin of the orifice, setose. Length of pupa case—about 1.0 mm.

Host.—Daphniphyllum glaucescens, attacking the lower side of leaf.

Hab.—Sozan.

Some specimens were obtained on June 21, 1931. This species is characterized by the structures of thoracic tracheal folds and by possessing many papillae and long dorsal bristles, and is not a typical form of the subgenus.

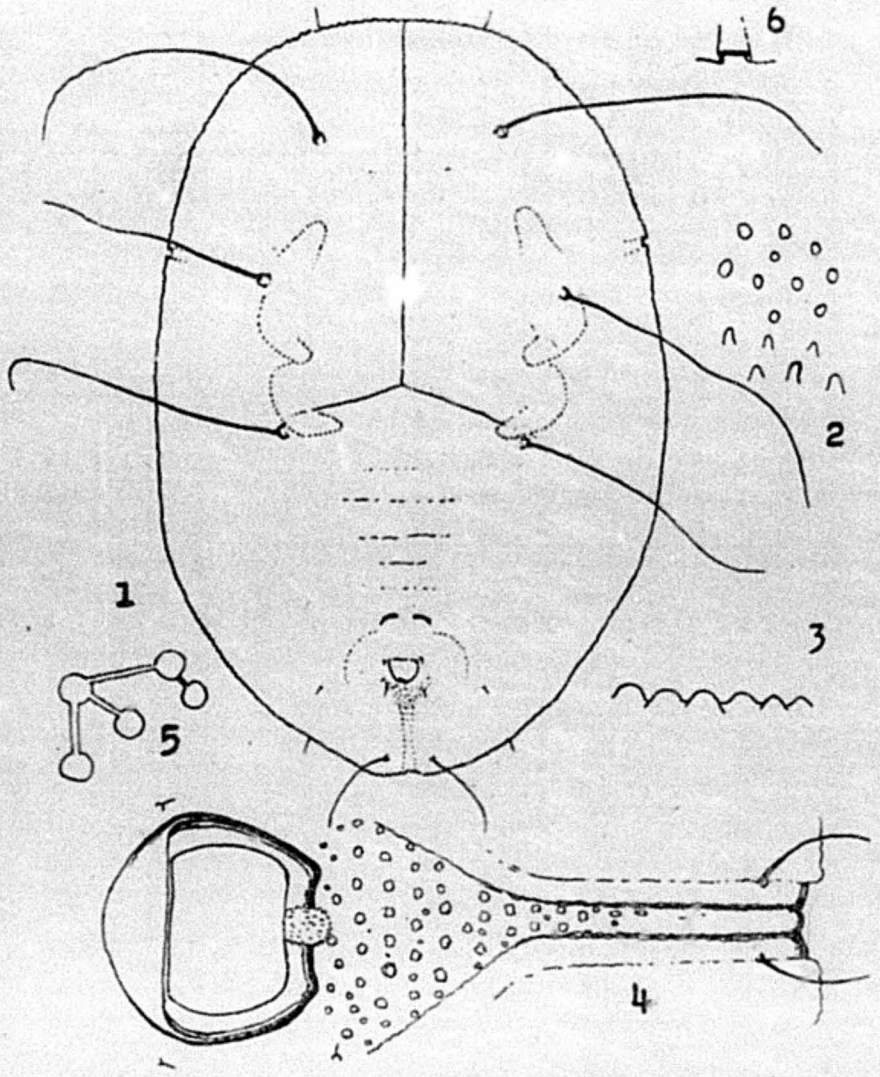


Fig. 4.

Dialeurodes multipori n. sp.

(Pupa case)

1. Outline. 2. Papillae. 3. Marginal teeth. 4. Vasiform orifice and caudal furrow. 5. Ventral pores. 6. Distal end of thoracic tracheal fold.

Dialeurodes (Gigaleurodes) lithocarpi Takahashi.

Jl. Soc. Trop. Agr. Formosa, III, p. 218 (1931).

Host.—Lithocarpus ternaticupula.

Hab.—Suisha.

Dialeurodes (Gigaleurodes) cinnamomi n. sp.

(Pupa case) Pale yellow, with a longitudinal yellowish red patch at the middle. Flattened, thin, broadest on the hind part of cephalothorax, narrowing posteriorly on the abdomen, widely indented on the front margin, rounded on the front angles of the head. Mid-thoracic suture nearly reaching the margin, transverse thoracic sutures and abdominal segments distinct on the median area. Cephalothorax with a pair of large groups of short rounded papillae on the hind part, the papillae small, variable in size, numerous in each group; a pair of rather small transversely oval pores present near the front margin of mesothorax; a pair of rather small circular pores on each of the meso- and metathoraci; basal 6 abdominal segments each with a pair of small transversely oval pores. Dorsum with faint lines running from the margin, a pair of short setae in front of the vasiform orifice, and a smaller seta and a very small spine laterad of the orifice. Margin faintly crenate. Thoracic tracheal folds faintly discernible, without dots and markings, the distal ends not indented, forming no pore, but narrowly chitinized on the margin. Caudal furrow long, narrow, not distinct anteriorly, lacking markings, more narrow than the thoracic tracheal folds, the distal end as in the thoracic folds. Vasiform orifice small, wider than long, subcordate, lacking teeth and notch, thickened on the margin. Operculum wider than long, somewhat indented on the hind margin, nearly filling the orifice. Length of pupa case—about 1.1mm.

Host.—Cinnamomum japonicum.

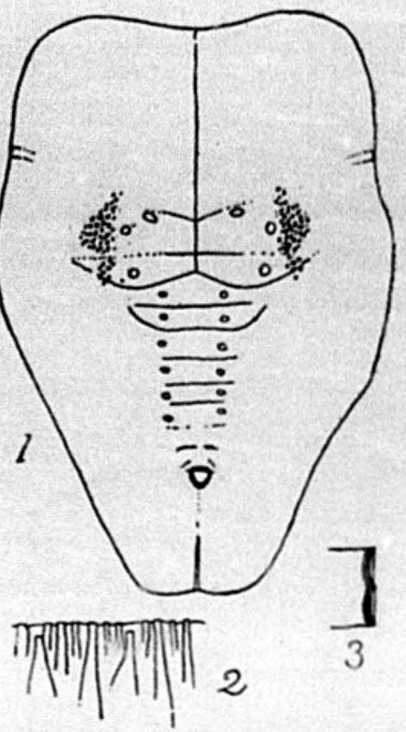


Fig. 5.
Dialeurodes cinnamomi n. sp.
(Pupa case)
1. Outline. 2. Margin.
3. Distal end of thoracic tracheal fold.

Hab.—Urai.

Related to *Dialeurodes simmondi* Corbett, but differs in possessing a pair of groups of papillae on the cephalothorax and in some other characters.

Singhius n. subgenus.

(Pupa case) Differs from other subgenera of *Dialeurodes* in the rectangular vasiform orifice and in the caudal furrow entirely connecting with the posterior margin of vasiform orifice.

Type.—*Aleyrodes hibisci* Kotinsky (syn. *Dialeurodes fletcheri* Singh).

Dialeurodes (Singhius) hibisci Kotinsky.

Aleyrodes hibisci, Kotinsky, Board Comm. Agr. Forest. Hawaii, Bull. 2, p. 96 (1907).

Dialeurodes fletcheri, Singh, Mem. Dept. Agr. Ind., Ent. Ser., XII, p. 39 (1931).

Hosts.—Salix sp., Sapium sebiferum, Machilus sp., Celtis sinensis, Glochidion hongkongense, Cinnamomum camphora, Bridelia sp., Macaranga tanarius, Jasminum sp., Hibiscus rosa-sinensis.

Hab.—Taihoku, Shinten, Urai.

Very common, but hitherto unrecorded from Formosa. Singh's species is no doubt a synonym of the species.

Dialeurodes (Dialeuroplata) bladhiae Takahashi.

Jl. Soc. Trop. Agr. Formosa, III, p. 219 (1931).

Host.—Bladhia sieboldii.

Hab.—Sozan.

The pupa case with some very small circular pores on the dorsal disk which are as large as those on the submarginal area and are arranged in a transverse row (4 in each row) on the median area of each abdominal segment; rachis absent.

Dialeurodes (Dialeuropora) setigerus n. sp.

Dialeurodes decempuncta, Singh (nec. Quaintance and Baker), Mem. Dept. Agr. India, Ent. Ser., XII, p. 34 (1931).

(Pupa case) Pale in colour. Elliptic, flattened, with 5 pairs of large circular pores on the submarginal area, which are chitinized on the margin; and 12 pairs of short spines along the margin, which are swollen about the middle, sharply pointed,

reaching beyond the margin, the last pair longer. Mid-thoracic and transverse sutures not reaching the margin; abdominal segments distinct on the median area. Dorsum with a pair of short stout spines on the cephalothorax, a pair of short spines on the basal abdominal segment which are similar to the marginal spines; a pair of long very stout bristles near the vasiform orifice; and a pair of spines in front of the last pair of submarginal pores. Margin crenate. Thoracic tracheal folds faintly discernible, the pores not discernible. Caudal furrow somewhat developed, without distinct markings. Vasiform orifice wider than long, broadly rounded on the hind margin, without teeth. Operculum wider than long, narrowed on the distal part, nearly straight on the hind margin, filling most of the orifice. Lingula extending beyond or not the hind margin of the orifice, setose, somewhat bilobed apically. Length of pupa case—about 1.0 mm.

Host.—Machilus sp.

Hab.—Shinten.

Described from specimens collected on June 14, 1931. This species is closely allied to *D. decempuncta* Quaint et Baker, but is different from it in the shape of the pupa case, in the positions of the thoracic tracheal folds and submarginal spines, etc.

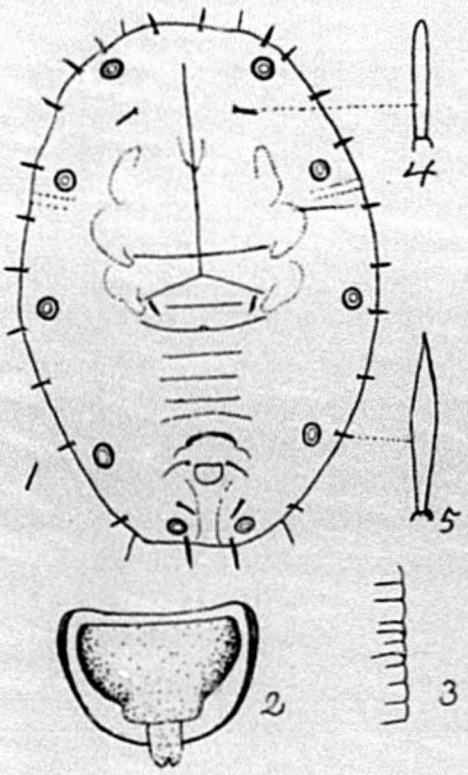


Fig. 6.
Dialeurodes setigerus n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice.
3. Margin. 4. Spine on cephalothorax.
5. Submarginal spine.

Dialeurodes (Dialeuropora) murrayae Takahashi.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 262 (1931).

Hosts.—Murraya spp.

Hab.—Taihoku.

Dialeurodes (Dialeuropora) brideliae n. sp.

(Pupa case) Nearly white, with no secretion evident. Elliptic, not narrowed

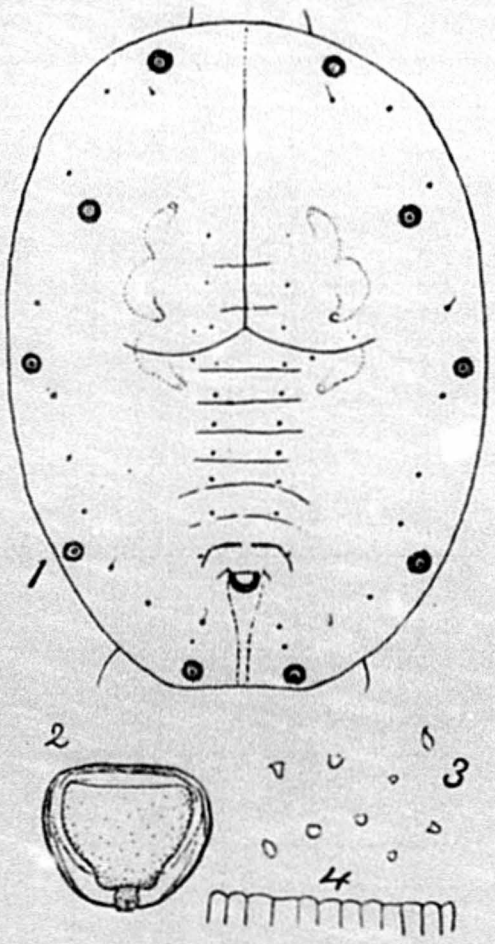


Fig. 7.
Dialeurodes brideliae n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice.
3. Dorsal papillae. 4. Margin.

anteriorly, nearly straight or somewhat indented on the hind margin, flattened, thin, with a narrow marginal rim. Mid-thoracic suture not distinct on the anterior part, transverse suture not reaching the margin, abdominal segments distinct on the median area. Dorsum with many short papillae scattered except on the marginal very narrow area, 5 pairs of rather large circular submarginal pores a little protruding and subequal in size, and some very short submarginal setae as shown in the figure; many not eminent radiating lines present on the submarginal area. Margin with many very small teeth wider than long, and a pair of rather long setae on the anterior and posterior parts. Thoracic tracheal folds not discernible. Caudal furrow not distinct, without dots. Vasiform orifice as long as or a little shorter than wide, much larger than the submarginal pore, without teeth. Operculum narrowed on the posterior part, somewhat indented on the hind margin, nearly filling the orifice. Lingula reaching to or beyond the hind margin of the orifice, but sometimes concealed, knobbed, slightly divided at the tip. Length of pupa case—about 1.2 mm.

Host.—Bridelia ovata, Machilus sp.

Hab.—Taihoku, Shinten, Urai, Sankyaku near Taihoku.

Common. Differs from *D. setigerus* Takah. in the smaller submarginal pores, in lacking submarginal spines and in possessing papillae.

Dialeurodes (Rachisphora) machili n. sp.

(Pupa case) Pale brown. Elliptic, slightly pointed at the anterior end.

Mid-thoracic suture reaching the margin, distinct; transverse suture not raching it; abdominal segments distinct; rachis eminent, with some small blunt rounded chitinized tubercles. Dorsum with many minute rounded conical papillae scattered as shown in the figure; a minute capitate seta present close to each papilla; cephalothorax with a shallow median ridge and 2 pairs of very short truncate setae; a similar truncate seta present laterad of the vasiform orifice; 24 very short spines arranged in a row along the whole margin, which are very slightly swollen, pointed apically, reaching a little beyond the margin, each arising from a small tubercle; the tubercles somewhat broader than the spine; a pair of longer spines present near the hind end. Margin with many very small rounded teeth wider than long, a pair of short anterior setae, and a pair of similar latero-posterior ones. Thoracic tracheal folds scarcely discernible, without dots, the distal pores very small, at the margin of the case, with no teeth. Caudal furrow somewhat widened anteriorly, not chitinized on the lateral margins except on the distal parts, without markings. Vasiform orifice nearly as long as wide, somewhat elevated, thickened on the lateral margins, lacking teeth, but with a small median notch.

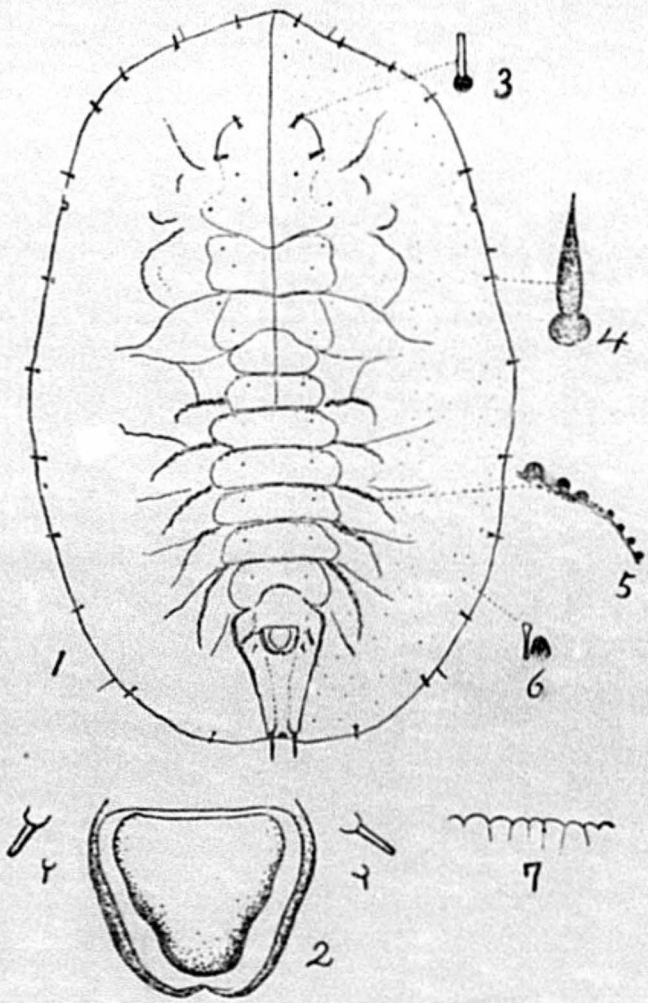


Fig. 8.
Dialeurodes machili n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice. 3. Spine on cephalothorax. 4. Spine near margin. 5. Tubercles on rachis. 6. Dorsal papilla and accessory seta. 7. Margin.

Operculum nearly as long as wide, narrowed on the posterior part, nearly filling the orifice. Lingula not exposed, slightly knobbed, with many long setae. Antennae very long, slender. Length of pupa case—about 1.26 mm.

Host.—Machilus sp.

Hab.—Shinten, Urai.

Described from specimens taken on Aug. 9, 1931. Near to *D. trilobitoides* Quaint. et Baker, but differs in the shape of pupa case and in some other characters.

Dialeurodes (Rachisphora) maesae n. sp.

(Pupa case) Elongate, elliptic, not constricted, somewhat pointed at the hind end. Mid-thoracic suture reaching the margin, transverse suture nearly so, abdominal segments distinct; rachis eminent, with some very short blunt chitinized denticles. Cephalothorax with a shallow median ridge on the anterior part, a pair of longitudinal very narrow chitinized folds extending to the 2nd abdominal segment, and 4 pairs of very short spines which are pointed apically and swollen about the middle. Abdominal segments 2–6 each with a pair of similar spines near the hind margin and a pair of paired minute circular pores at the middle. Dorsum with faint small polygonal markings except on the median area and some minute paired pores sparsely scattered. Margin somewhat crenate; some short spines arranged in a single row along the margin, similar in shape to those on the median area, equal in length, reaching beyond the margin. Thoracic tracheal

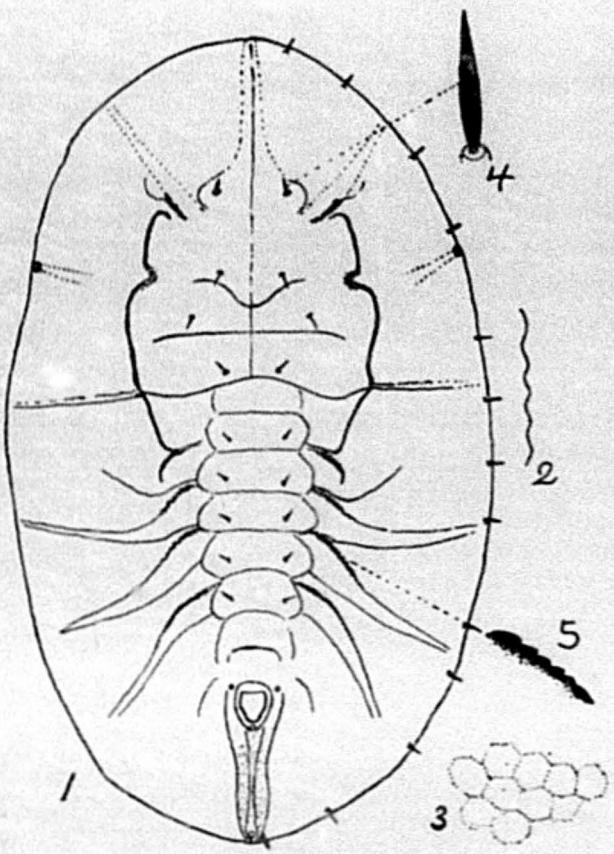


Fig. 9.
Dialeurodes maesae n. sp.
(Pupa case)
1. Outline. 2. Margin. 3. Dorsal markings.
4. Dorsal spine. 5. Denticles on rachis.

folds distinct, without dots and markings, the distal ends forming a complete pore which is small, chitinized on the margin, lacking teeth, located just at the margin of the case. Caudal furrow distinct, expanded basally, thickened on the sides, with many minute dots, the distal end as in the thoracic tracheal folds. Vasiform orifice large, subcordate, longer than wide, notched on the hind end, without teeth. Operculum slightly wider than long, somewhat narrowed on the posterior part, slightly indented on the hind margin, filling most of the orifice. Lingula long, reaching the hind end of the orifice. Length of pupa case—about 1.5 mm.

Host.—Maesa japonica.

Hab.—Urai.

Described from a single specim collected on Sept. 6, 1931. Related to *D. machili* Takah., but differs remarkably in many characters (see the figures).

Dialeurodes (Rachisphora) fici n. sp.

(Pupa case) Pale yellow, with no secretion evident. Elliptic, not narrowed anteriorly, not or very slightly constricted across the thoracic tracheal folds, flattened, thin, without ridges. Mid thoracic suture not distinct, transverse suture not reaching the margin, abdominal segments distinct on the median area; rachis absent. Dorsum with many small short papillae over the whole surface, a few minute circular pores, some very short capitate setae in a row on the submarginal area, and a pair of similar setae on the median part of the head; a pair of rather long normal setae present near the vasiform orifice. Margin faintly crenate, with a pair of short anterior setae and a pair of longer latero-posterior setae. Thoracic tracheal folds distinct, without dots; the pores small, thickened on the margin,

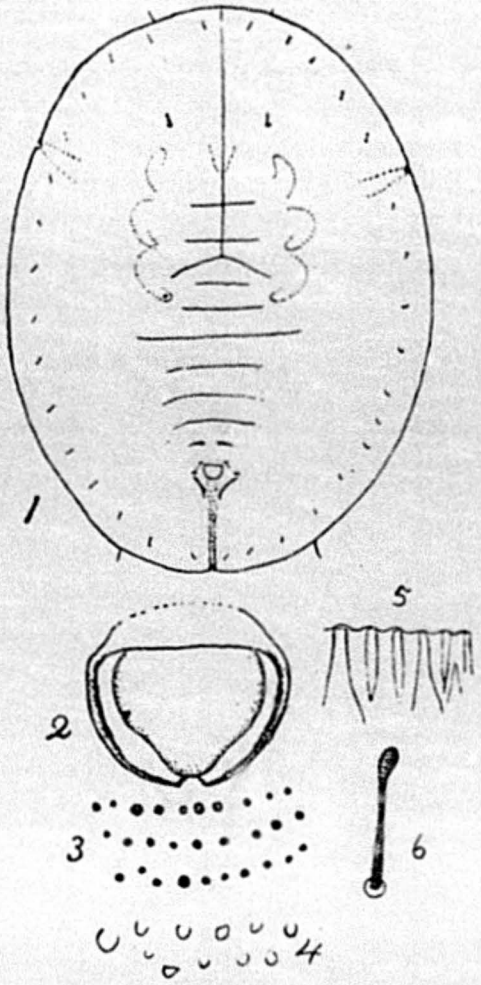


Fig. 10.
Dialeurodes fici n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice. 3. Markings on basal part of caudal furrow. 4. Dorsal papillae. 5. Margin. 6. Submarginal seta.

opening nearly at the margin of the pupa case, with no distinct teeth. Caudal forrow distinct, somewhat widened anteriorly, thickened on the basal parts of the lateral margins, with many distinct markings which are usually smaller and arranged in transverse rows on the basal part, but are not in rows on the distal part, nearly similar to those of *Dialeurodes citrifolii*. Vasiform orifice wider than long, rounded, thickened on the margin, lacking teeth, but with a small median notch. Operculum narrowed on the distal part, rounded on the distal margin, nearly filling the orifice. Lingula not exposed. Length of pupa case—about 1.4 mm.

Hosts.—Ficus vasculosa, Celtis sinensis, Fagara ailanthoides.

Hab.—Taihoku, Sankyaku near Taihoku.

Common, sometimes occurring in abundance. Resembles *D. citrifolii* Morgan, differing remarkably in lacking teeth in the vasiform orifice and in possessing submarginal setae, and differs also from all the known species of the subgenus in the characters of the submarginal setae, as well as in other structures. The dorsal setae of the pupa case on Celtis are usually much longer.

Acanthaleyrodes callicarpae Takahashi.

Jl. Soc. Trop. Agric. Formosa, III, p. 221 (1931).

Hosts.—Callicarpa formosana, Mallotus sp.

Hab.—Taihoku, Shinten.

Aleurotuberculatus n. genus.

(Pupa cass) Oval, with 5 or fewer pairs of inconspicuous blunt tubercles on the cephalothorax, Submarginal area usually more or less separated from the dorsal disk, narrow. Dorsum with granules or papillae. Margin with small teeth. Thoracic tracheal folds usually not discernible, but distinct thoracic tracheal clefts present on the margin. Caudal furrow distinct. Vasiform orifice subcordate, lacking teeth, but with a distinct notch at the hind end. Operculum nearly filling the orifice. Lingula not exposed.

Type.—*Aleurotuberculatus gordoniae* n. sp.

Closely allied to *Aleuroclava* Singh, and may be its synonym, but differs from Singh's description and figures in possessing thoracic tracheal clefts, as well as, in the submarginal area more or less separated from the dorsal disk. This genus seems to be also related to *Pseudaleurolobus* Hempel, differing, however, from the brief description by Hempel in the characters of vasiform orifice and in possessing dorsal blunt tubercles. *Aleurotrachelus psidii* Singh, *A. murrayae* Singh and *Tetraleurodes aucubae* Kuwana must be included in this new genus.

In Formosa 8 species are now known.

Aleurotuberculatus gordoniae n. sp.

(Pupa case) Black, with no secretion. As in *A. aucubae* Kuwana in shape. Mid-thoracic and transverse sutures reaching the margin of dorsal disk; abdominal segments distinct on the median area. Dorsal disk with many small granules except on the median area of abdomen and the marginal area, some minute circular pores, and many lineal markings on the marginal area. Cephalothorax with 4 pairs of very short blunt inconspicuous tubercles and a pair of short setae; abdomen with shrink-like markings on the median area. Submarginal area narrow, defined from the dorsal disk, with markings as shown in the figure. Margin with very small rounded teeth much wider than long, a pair of very short latero-anterior setae, a pair of similar latero-posterior ones, and a pair of much longer posterior bristles. Thoracic tracheal folds faintly discernible, the clefts small, not forming a pore; a small blunt tubercle present above the cleft. Caudal furrow distinct, somewhat expanded basally, somewhat chitinized on the lateral margins, lacking distinct markings; the distal end as in the thoracic tracheal clefts. Vasiform orifice small, wider than long, thickened on the lateral margins, expanded on the front margin, notched at the hind end, without teeth, between 2 longitudinally thickened parts. Operculum wider than long, somewhat constricted at the base, somewhat narrowed towards the hind margin on the posterior half, rounded on the hind margin, nearly filling the orifice. Lingula not exposed. Length of pupa case—about 0.75 mm.

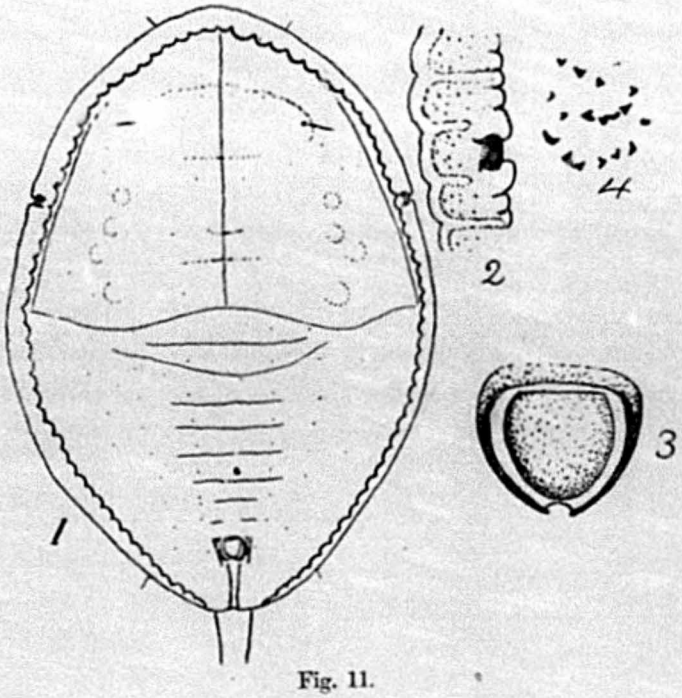


Fig. 11.
Aleurotuberculatus gordoniae n. sp.
(Pupa case)
1. Outline. 2. Thoracic tracheal cleft and marginal area.
3. Vasiform orifice. 4. Dorsal granules.

Hosts.—Pourthiaea benthamiana, Gordonia anomala, Cinnamomum camphora, C.

japonicum, Agalma lutchuense, Ficus retusa.

Hab.—Urai, Shinten, Taihoku, Sozan.

Common. Closely allied to *A. aucubae* Kuwana,differing in the characters of the submarginal area. The submarginal area is provided with many transverse ridges which are rounded and look to be short tubercles in some specimens.

Aleurotuberculatus guyavae n. sp.

(Pupa case) Black, without secretion evident. Oval, narrowed on the posterior part, slightly constricted across the thoracic tracheal clefts. Submarginal area narrow, distinct, with markings as shown in the figure. Mid-thoracic and transverse sutures reaching the margin of the dorsal disk; abdominal segments distinct on the median area. Dorsum distinctly granular, with peculiar markings on the median area of abdomen; cephalothorax with 4 pairs of very short blunt tubercles and a pair of stout setae on the anterior part, which are not reaching the margin; abdomen with a pair of shorter setae near the base and a pair of setae near the vasiform orfice. Marginal teeth very small, short, rounded, wider than long; a pair of short setae present on the anterior and posterior margins; a pair of very long stout setae on the hind end. Thoracic tracheal folds not distinct, without dots; the clefts thickened on the margin, small, lacking teeth, not forming a pore. Caudal furrow distinct, expanded basally, thickened on the lateral margins, without dots, but with some small irregular markings; the distal end as in the thoracic clefts. Vasiform orifice large, nearly quadrate, rounded on the corners, a little wider than long, widely notched on the hind margin, lacking teeth, located between 2 longitudinal thicken-

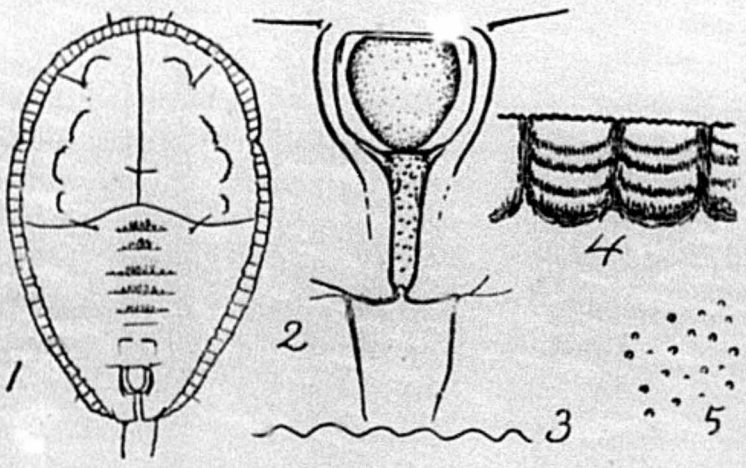


Fig. 12.
Aleurotuberculatus guyavae n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice and caudal furrow. 3. Marginal teeth. 4. Markings on submarginal area. 5. Dorsal granules.

ings. Operculum as long as or longer than wide, rounded on the hind margin, nearly filling the orifice. Lingula not exposed. Length of pupa case—about 0.75 mm.

Host.—Psidium guyava.

Hab.—Taihoku.

Allied to *A. murrayae* Singh, but differs in the characters of vasiform orifice.

Aleurotuberculatus elatostemae n. sp.

(Pupa case) White. Elongate, oval, narrowed posteriorly, with a small, but distinct notch on the hind end. Mid-thoracic and transverse sutures not reaching the margin of dorsal disk; suture between the pro- and mesothoraci distinct on the median area; abdominal segments not distinct. Dorsum with many very small chitinized granules or papillae which are conical, pointed apically, slightly longer than or as long as wide, very few or absent on the marginal area of dorsal disk, and some of them divided on the distal part. Cephalothorax on the anterior part with a shallow median ridge which is furnished with many granules, and with 5 pairs of short blunt tubercles which are provided with granules; the anterior pair of tubercles largest, each with a short stout seta. Abdomen with 7 short blunt median tubercles in a longitudinal row, each of which except the last one is furnished with 3–5 granules, the granules a little larger than other dorsal ones; a pair of very long bristles each arising from a blunt protuberance present near the hind end. Submarginal area narrow, distinct from the dorsal disk, with short rounded tubercles and markings as shown in the figur. Margin with many minute teeth which are nearly triangular, rounded apically, wider than long; a pair of short latero-posterior setae present. Thoracic tracheal folds discernible on the submarginal area; the clefts distinct, small, not forming pores. Caudal furrow distinct. Vasiform orifice rather large, wider than long, with a notch. Length of pupa case—about 0.57 mm. Width—about 0.314 mm.

Host.—Elatostema sp.

Hab.—Sozan.

Described from a rather incomplete specimen taken on Aug. 20, 1931. This species is characterized by the presence of median tubercles on the abdomen and also by some of the dorsal granules divided.

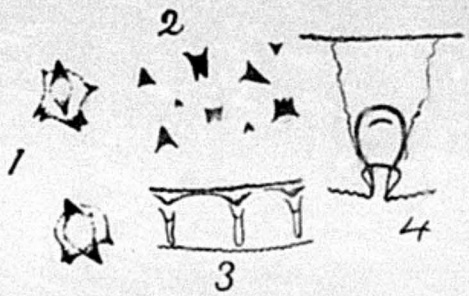


Fig. 13.
Aleurotuberculatus elatostemae n. sp.
(Pupa case)
1. Median tubercles on abdomen. 2. Dorsal papillae. 3. Marginal area. 4. Thoracic tracheal fold and cleft.

Aleurotuberculatus psidii Singh.

Aleurotrachelus psidii, Singh, Mem. Dept. Agr. India, Ent. Ser., XII, p. 61 (1931).

Hosts.—Euphoria longana, Maesa sp., Cinnamomum camphora, Psidium guyava, Salix sp., Bridelia ovata.

Hab.—Taihoku, Washoshu.

Very common, but hitherto unrecorded from Formosa.

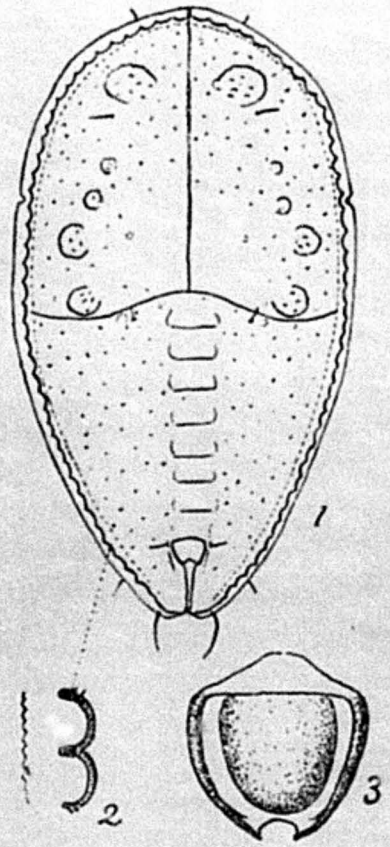


Fig. 14.
Aleurotuberculatus psidii Singh.
(Pupa case)
1. Outline. 2. Margin.
3. Vasiform orifice.

Aleurotuberculatus ficicola n. sp.

(Pupa case) Pale yellowish white. Oval, flat, slightly constricted across the thoracic tracheal clefts, with a shallow median ridge on the cephalothorax, which is not reaching the front margin, with short-papilla-like markings. Transverse suture not reaching the margin; abdominal segments distinct on the median area. Cephalothorax with 5 pairs of short blunt tubercles chitinized and granular on the surface, of which the anterior pair are largest, with a short seta at the tip. Dorsum with peculiar median markings on the basal 5 abdominal segments, without pores and papillae excepting very small rounded papillae in a row along the margin of the dorsal disk, with a pair of very long bristles near the hind end. Submarginal area narrow, not well defined, with markings as shown in the figure. Marginal teeth very small, rounded, much wider than long; a pair of short anterior setae and a pair of similar latero-posterior setae present on the margin. Thoracic tracheal folds not discernible, but small thoracic tracheal clefts present. Caudal furrow distinct, not widened anteriorly, somewhat thickened on the lateral margins, lacking markings. Vasiform orifice nearly as long as wide, rounded, much expanded on the front margin, with a small, but distinct notch at the hind end. Operculum somewhat longer than wide, somewhat narrowed posteriorly, nearly straight on the hind margin, filling most of the orifice. Length of pupa case—about 0.8 mm.

Host.—Ficus sp.

Hab.—Shikikun near Taihezan.

A few specimens were collected on May 21, 1931. Differs from other species in possessing larger dorsal tubercles on the cephalothorax.

Aleurotuberculatus malloti n. sp.

(Pupa case) White, slightly pale brownish, with no secretion evident. Broadly oval, somewhat narrowed on the posterior part, flat, with a notch on the hind end. Mid-thoracic and transverse sutures not reaching the margin; abdominal segments distinct on the median area. Dorsum densely with many very short rounded papillae which are rather large, variable in size, arranged in transverse rows on the median area of abdomen; submarginal area not separated from the dorsal disk, with markings as shown in the figure. Cephalothorax with 5 pairs of very small rounded tubercles, of which the last ones are largest; a pair of very long bristles present on the anterior part, which are reaching beyond the margin. Margin with many very small rounded teeth wider than long, a pair of short anterior setae, a pair of short latero-posterior ones and a pair of very long posterior bristles. Venter with many very large cincular and oval indistinct markings and an indistinct marginal rim. Thoracic tracheal folds not discernible, but the clefts very wide, shallow, chitinized on the margin. Caudal furrow distinct, widened at the base, a little

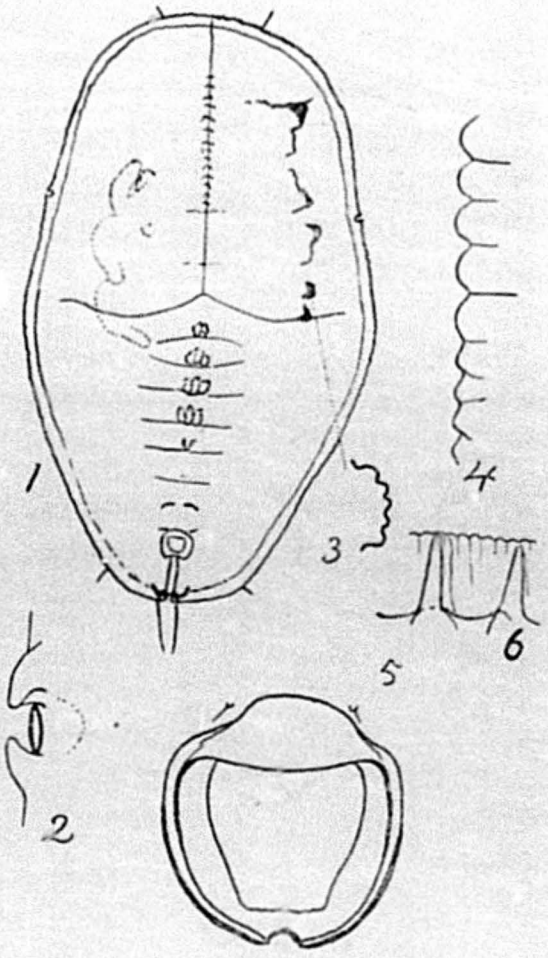


Fig. 15.
Aleurotuberculatus ficicola n. sp.
(Pupa case)
1. Outline. 2. Thoracic tracheal cleft. 3. Dorsal tubercle. 4. Margin. 5. Vasiform orifice. 6. Submarginal area.

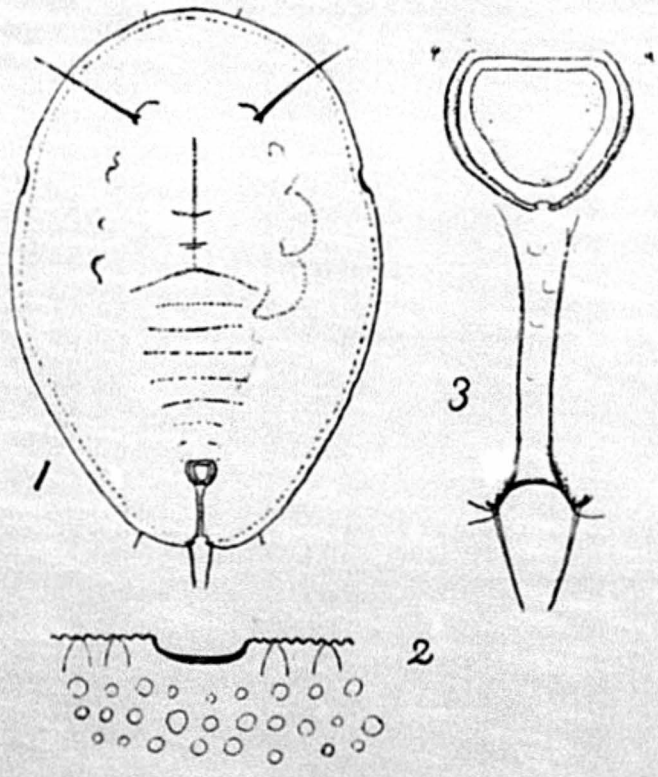


Fig. 16.
Aleurotuberculatus malloti n. sp.
(Pupa case)
1. Outline. 2. Dorsal papillae and thoracic tracheal cleft. 3. Vasiform orifice and caudal furrow.

thickened on the lateral margins, without distinct markings. Vasiform orifice wider than long, rounded, thickened on the lateral margins, lacking teeth, but with a small notch. Operculum narrowed on the posterior part, concealing the lingula, nearly filling the orifice. Length of pupa case—about 0.65 mm.

Host.—Mallotus sp.

Hab.—Shinten, Kusshaku.

Common. The submarginal area is not separated from the dorsal disk, resembling *Aleuroclava* Singh, but differs from Singh's description of the genus in possessing thoracic tracheal clefts. Differs also from other species of *Aleurotuberculatus* in possessing many eminent dorsal papillae.

Aleurotuberculatus jasmini n. sp.

(Pupa case) Submarginal area very narrow, not well separated from the dorsal disk, resembling *Aleuroclava complex* Singh, but differs from Singh's description and figures in the following characters:

(1) Dorsum with only submarginal papillae distinct, which are arranged in a row.

(2) Cephalothorax with 5 pairs of small short blunt tubercles, of which 2 pairs are on the metathorax.

(3) Dorsal setae on the cephalothorax and basal abdominal segment longer.

Fig. 17.
Aleurotuberculatus jasmini n. sp. (Pupa case)
Thoracic tracheal cleft, margin and submarginal papillae.

(4) Thoracic tracheal folds faintly discernible, the clefts as shown in the figure.

Host.—Jasminum sp.

Hab.—Taihoku.

The vasiform orifice is wider than long, thickened and rounded on the lateral margins, widely notched on the hind margin, and lacking teeth; the operculum is nearly similar in shape to the orifice, filling most of it.

Aleurotuberculatus uraianus n. sp.

(Pupa case) White or slightly pale yellowish, without secretion. Elliptic, thin, flattened, broadest about the middle. Mid-thoracic suture nearly reaching the margin, transverse suture not reaching it; abdominal segments distinct on the median area. Submarginal area narrow, scarcely separated. Dorsum with some small uneminent papillae in a row near the margin. Cephalothorax as long as the abdomen, with 4 pairs of small rounded blunt tubercles, of which the anterior pair are much smaller, with a short seta, the remaining pairs subequal in size, wider than long. Abdomen with a pair of very short setae each arising from a very small tubercle on the basal segment, lacking pores and papillae on the median area, with a pair of long stout setae near the hind end. Marginal teeth minute, triangular, wider than long, rounded apically; a pair of short anterior setae and a pair of longer latero-posterior setae present on the margin. Thoracic tracheal folds distinct, narrow, lacking markings; the clefts distinct. Caudal furrow distinct, somewhat widened anteriorly, without markings. Vasiform orifice rather small, wider than long, rounded, expanded on the front margin, a little notched at the hind margin, without teeth. Operculum wider than long, narrowed on tne hind part, nearly straight on the hind margin, nearly filling the orifice. Lingula not exposed. Length of pupa case—about 0.75 mm. Width—about 0.5 mm.

Host.—Clerodendron sp.

Hab.—Urai.

Described from specimens collected on Dec. 29, 1930. Resembles *Aleurothrixus indicus* Singh, which is not a true *Aleurothrixus*, but differs in the characters of dorsal setae and in possessing thoracic tracheal folds. Differs also from other species of the genus in the presence of distinct thoracic tracheal folds. Allied to *A. jasmini* Takah., but is differentiated from it by the smaller submarginal papillae, the narrower thoracic tracheal clefts, possessing 4 pairs of tubercles on the cephalothorax, etc.

Taiwanaleyrodes n. genus.

(Pupa case) Oval, without dorsal tubercles, but with small granules. Submarginal area not at all separated from the dorsal disk, marginal area bent downwards. Marginal narrow area of venter separated from the median area, forming a distinct rim. Margin with small teeth. Thoracic tracheal folds not discernible, the clefts absent. Caudal furrow distinct. Vasiform orifice rounded, lacking teeth, notched at the hind end. Operculum nearly filling the orifice. Lingula not exposed.

Type.—*Taiwanaleyrodes meliosmae* n. sp.

Allied to *Aleurotuberculatus* Takah., but differs from it in lacking dorsal tubercles and thoracic tracheal clefts, but in possessing a distinct marginal rim on the venter, and also distinguishable from *Aleurocybotus* Quaint. et Baker by possessing a distinct caudal furrow, in the lingula not exposed, etc. At present a species is known in Formosa.

Taiwanaleyrodes meliosmae n. sp.

(Pupa case) White, with no secretion evident. Oval, flat, narrowed posteriorly. Mid-thoracic suture not eminent, transverse suture not reaching the margin; abdominal segments distinct on the median area. Dorsum bent downwards on the margin, granular or with many very short, small papillae, which are arranged in transverse rows on the median area of abdomen, and some minute circular pores; cephalothorax with a pair of very long bristles on the anterior part; abdomen with a pair of a little shorter bristles near the base, a pair of very short setae near the vasiform orifice, and many minute wavy lines on the median area. Margin with very small rounded teeth, a pair of short setae on the anterior and posterior portions, and a pair of long posterior bristles each arising from a small, but distinct, tubercle. Venter with a distinct marginal rim. Thoracic tracheal folds not discernible. Caudal furrow distinct, a little broadened towards the base, thickened on the lateral margins, distinctly notched on the hind end, with a few longitudinal curved markings which are not distinct in some individuals; some transverse strias present on the side of the furrow. Vasiform orifice large, as long as wide, rounded, distinctly notched on the hind margin, distinctly thickened on the lateral margins, without teeth; the anterior margin expanded. Operculum nearly as long as or a little longer than wide, rounded on the sides, nearly straight or indented on the hind margin, nearly filling the orifice. Lingula not or a little extending out of the operculum. Length of pupa case—about 0.75 mm.

Hosts.—Meliosma rhoifolia, Daphniphyllum glaucescens, Machilus sp., attacking the lower surface of leaves.

Hab.—Sozan, Shinten, Urai.

Some specimens were collected by the author on June 21 1931. Closely allied to an aleyrodid described under the name of *Aleyrodes euryae* Kuw. by Kuwana from Japan, but easily distinguished from it by the colour.

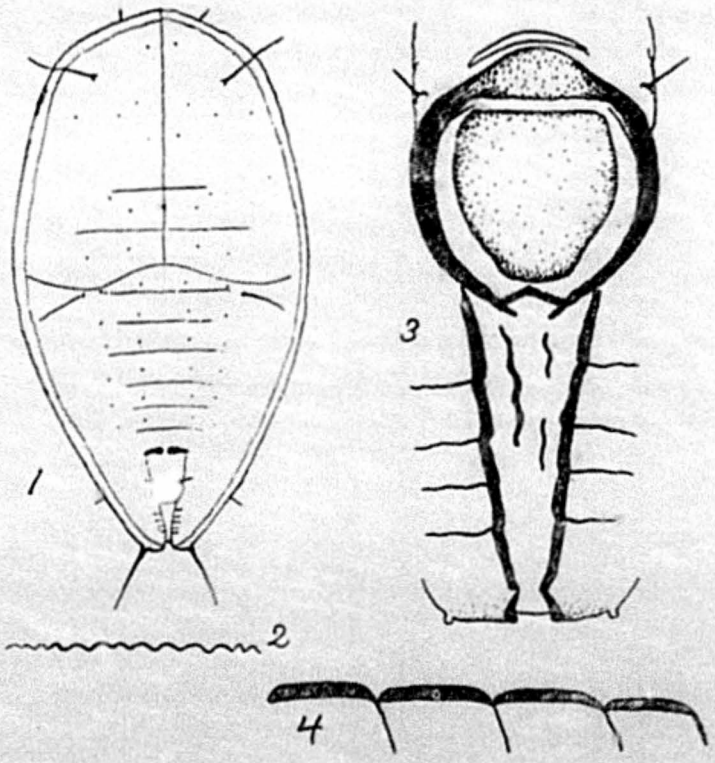


Fig. 18.
Taiwanaleyrodes meliosmae n. sp.
(Pupa case)
1. Outline. 2. Marginal teeth. 3. Vasiform orifice and caudal furrow. 4. Mesal part of ventral marginal rim.

Tuberaleyrodes n. g.

(Pupa case) Elliptic, with distinct tubercles on the dorsal disk, each of which possesses a seta. Submarginal area not separated from the dorsal disk. Margin with small teeth. Thoracic tracheal folds not discernible, without clefts and pores on the margin. Caudal furrow distinct. Vasiform orifice rounded, with a very small notch and indistinct teeth. Operculum filling most of the orifice. Lingula a little exposed.

Type.—*Tuberaleyrodes machili* n. sp.

This genus is characterized by the presence of dorsal tubercles on the median area.

Tuberaleyrodes machili n. sp.

(Pupa case) Pale in colour. Elliptic, flattened, thin, with a small indentation at the hind end. Mid-thoracic and transverse sutures not reaching the margin, abdominal segments not eminent. Dorsum with many small circular indistinct pores on the median area and many long lines extending mesad from the margin on the

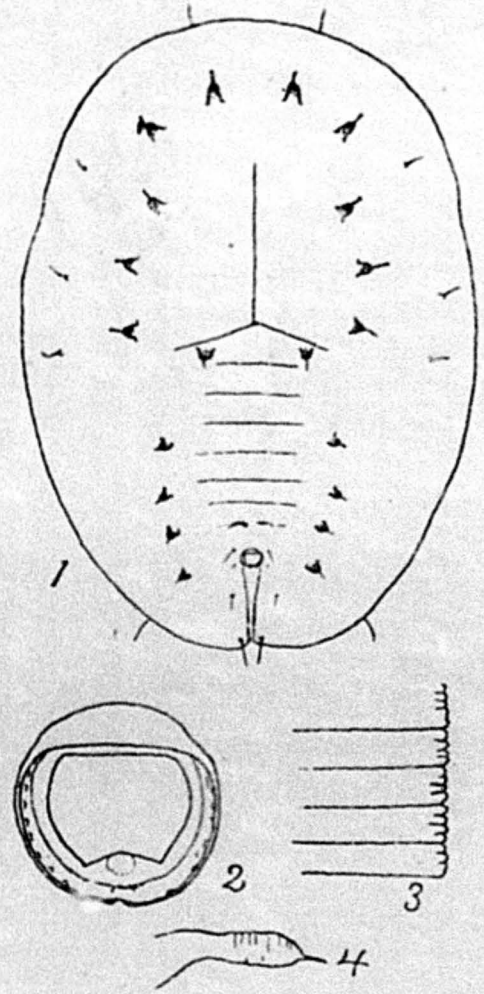


Fig. 19.
Tuberaleyrodes machili n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice.
3. Margin. 4. Antenna.

submarginal area; cephalothorax with 5 pairs of rather small chitinized tubercles and 3 pairs of short submarginal setae; abdomen with 5 pairs of smaller similar tubercles; each dorsal tubercle with a short stout apical seta very slightly knobbed; a pair of setae present near the vasiform orifice; a similar pair between the orifice and the hind margin; a pair of longer setae near the hind end. Margin with many very small rounded teeth wider than long, a pair of rather long anterior setae and a pair of similar latero-posterior ones. Venter with 4 pairs of very large subrectangular markings on the median area of abdomen. Thoracic tracheal folds not discernible. Caudal furrow distinct, widened on the basal part, somewhat thickened on the lateral margins of the posterior part, without distinct markings. Vasiform orifice rounded, as long as or a little longer than wide, expanded on the anterior margin, with a very small notch and some indistinct very small teeth. Operculum rounded on the lateral margins, indented on the hind margin, wider than long, filling most of the orifice. Lingula a little exposed. Length of pupa case—about 1.15 mm.

Host.—Machilus sp.

Hab.—Taihezan, Urai.

Described from specimens collected on May 21, 1931.

Aleuroplatus (Aleuroplatus) pectiniferus Quaintance et Baker.

Proc. U. S. Nat. Mus, LI, p. 393, (1917).

Hosts.—Ficus vasculosa, Salix sp., Gordonia anomala, Morus sp., Bischofia javanica, Alnus formosana.

Hab.—Taihoku.

Common, occurring, however, in small numbers. Hitherto unrecorded from Formosa. Resembles *Aleuroplatus ficus-gibosae* Corbett in the shape of pupa case, but may be readily separated from it by the number of the teeth of thoracic combs. Differs from the original description in being covered with gelatinous substance.

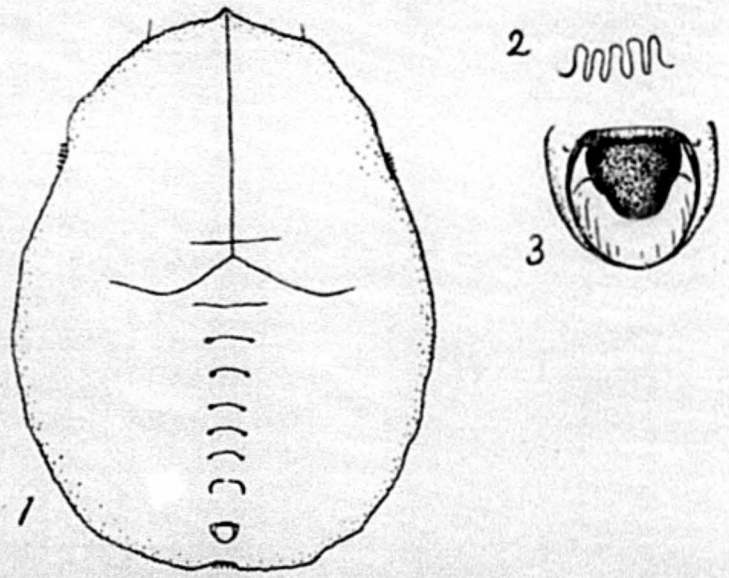


Fig. 20.
Aleuroplatus pectiniferus Quaint. et Baker.
(Pupa case)
1. Outline. 2. Thoracic comb. 3. Vasiform orifice.

Aleuroplatus (Aleuroplatus) fici n. sp.

(Pupa case) Pale yellowish. Elliptic, not narrowed anteriorly, flat, without secretion evident. Mid-thoracic suture reaching the margin, transverse suture not so; abdominal segments distinct on the median area. Dorsum with a few minute circular pores, many small short papillae densely scattered, and 5 pairs of very long bristles* as shown in the figure, which are somewhat curved, far reaching beyond the margin; the anterior 4 pairs subequal in length, longer than the rest; a pair of very small setae present near the base of the vasiform orifice. Margin somewhat crenate, with distinct wax-tubes, and a pair of short setae on the anterior and posterior parts. Thoracic tracheal folds distinct, with numerous minute dots; the comb with 4 or 5 small rounded teeth slightly protruding. Caudal furrow distinct, with numerous minute dots; the comb with 6 or 7 teeth similar to those of the thoracic folds. Vasiform orifice small, as in *Aleuroplatus ficus-rugosae* Quaint. et Baker (U. S. Nat. Mus. Proc., LI, pl. 49, 14). Operculum and lingula also as in that species. Length of pupa case—about 1.5 mm.

Host.—Ficus retusa, attacking the lower side of leaf.

Hab.—Taihoku, Kanaron, Shoke, Heito, Mako (Hokoto).

Very common. Closely allied to *Aleuroplatus ficus-rugosae* Quaint. et Baker,

* These dorsal setae are sometimes very small.

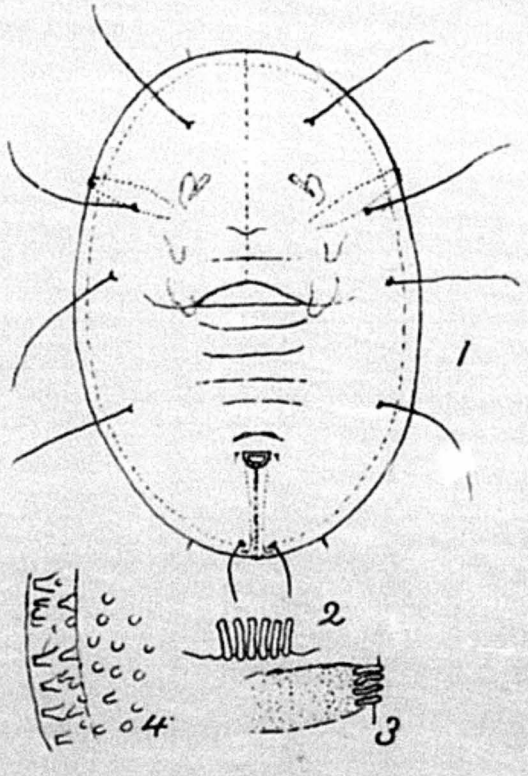


Fig. 21.
Aleuroplatus fici n. sp.
(Pupa case)
1. Outline. 2. Comb of caudal furrow. 3. Comb of thorax. 4. Marginal wax-tubes and papillae.

but differs from it in possessing long dorsal bristles and in other characters. *A. ficus-rugosae* Quaint. et Baker, and *A. ficus-gibbosae* Corbett have not been found in Formosa.

Bemisia giffardi Kotinsky.

Aleyrodes giffardi, Kotinsky, Board Comm. Agr. Forest. Hawaii, Div. Ent., Bull. no. 2, p. 94, (1907).

Bemisia giffardi, Quaintance and Baker, U. S. Dept. Agr., Bur. Ent., Tech. Ser., no. 27, pt. II, p. 100 (1914); Jl. Agr. Res., VI, p. 469 (1916); Silvestri, Boll. Lab. Zool. Portici, XXI, p. 15 (1927); Kuwana, Ann. Zool. Jap., XI, p. 245 (1927); Minist. Agr. Forest., Dept. Agr., Sc. Bull. I, p. 61 (1928); Kuwana and Ishii, Byokin Gaichu Iho, XVIII, p. 23 (1928); Singh, Mem. Dept. Agr. India, Ent. Ser., XII, p. 80 (1931).

Hosts.—Citrus spp.

Hab.—Washoshu near Taihoku.

Common, but has not been recorded from Formosa.

Bemisia pongamiae Takahashi.

Jl. Soc. Trop. Agric. Formosa, III, p. 223 (1931).

Host.—Pongamia pinnata.

Hab.—Taihoku.

Bemisia myricae Kuwana.

Ann. Zool. Jap., XI, p. 249 (1927); Kuwana and Ishii, Byokin Gaichu Iho, XVIII, p. 26 (1928); Kuwana, Minist. Agr. Forest., Dept. Agr., Sc. Bull. I, p. 63 (1928); Iino and Kajihara, Jl. Plant Protect., XVII, p. 589 (1930).

Hosts.—Machilus sp., Maesa japonica, Psidium guyava.

Hab.—Shinten, Urai, Taihoku, Washoshu.

New to the fauna of Formosa. This species is not uncommon near Taihoku, but has not been found on Myrica, Morus and Citrus in Formosa.

Bemisia aceri Takahashi.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 204 (1931).

Host.—Acer sp.

Hab.—Koro in Suo-Gun, Heito.

Bemisia achyranthes Singh.

Mem. Dept. Agr. Ind., Ent. Ser., XII, p. 82 (1931).

Host.—Crotalaria sp.

Hab.—Kusshaku near Shinten.

Previously known from India.

Bemisia gossypiperda Misra et Lamba.

Bull. Agr. Res. Inst. India, no. 196, p. 5 (1929); Husain, Agr. Jl. India, XXV, pt. 6, p. 508 (1930); Takahashi, Trans. Nat. Hist. Soc. Formosa, XXI, p. 203 (1931).

Aleurodes sp., Shiraki, Agr. Expt. St. Formosa, Spec. Rept., no. 5, p. 87 (1912).

Host.—Gossypium sp.

Hab.—Taihoku.

Aleurolobus oplismeni Takahashi.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 261 (1931).

Host.—Oplismenus compositus.

Hab.—Taihoku.

Aleurolobus setigerus Quaintance et Baker.

Proc. U. S. Nat. Mus., LI, p. 372 (1917); Corbett, Bull. Ent. Res., XVI, p. 279 (1926); Silvestri, Boll. Lab. Zool. Portici, XXI, p. 12 (1927).

Host.—Psidium guyava.

Hab.—Urai.

Some pupa cases were collected on Sept. 6, 1931. The operculum is pointed at the hind end, though rounded in Silvestri's figure.

Aleurolobus marlatti Quaintance.

Aleurodes marlatti, Quaintance, Can. Ent., XXXIV, p. 61 (1903) ; Kuwana, Pomona Coll. Jl. Ent., III, p. 623 (1911).

Aleurolobus marlatti, Quaintance and Baker, U. S. Dept. Agr., Bur. Ent., Tech. Ser., no. 27, pt. II, p. 109 (1914) ; Jl. Agr. Res., VI, p. 466 (1916) ; Proc. U. S. Nat. Mus., LI, p. 361 (1917) ; Silvestri, Boll. Lab. Zool. Portici, XXI, p. 11 (1927) ; Kuwana, Minist. Agr. Forest., Dept. Agr., Sc. Bull. I, p. 52 (1928) ; Kuwana and Ishii, Byokin Gaichu Iho, XVIII, p. 12 (1928).

Hosts.—Citrus spp.

Hab.—Taihoku, Washoshu.

Aleurocanthus spiniferus Quaint. was recorded from Formosa as *Aleyrodes marlatti* Quaint. by Shiraki and Maki.

Aleurolobus philippinensis Quaintance et Baker.

Proc. U. S. Nat. Mus., LI, p. 369 (1917).

Hosts.—Bladhia sieboldii, Gardenia florida, Salix sp.

Hab.—Taihoku, Shirin.

Hitherto unrecorded from Formosa.

Aleurolobus citri n. sp.

(Pupa case) Whitish. Oval, flat, thin. Mid-thoracic and transverse sutures not reaching the margin; abdominal segments distinct on the median area. Submarginal area separated from the dorsal disk except on the posterior small part, with many irregular lines extending mesad from the margin and a few minute circular pores more or less arranged in a row. Dorsal disk with a narrow chitinized wavy line on the margin, a few minute circular pores, and a pair of peculiar markings on the median area of each of the basal 6 abdominal segments; eye spots absent; a pair of short setae present near the base of vasiform orifice. Margin crenate, with a pair of short setae latero-posteriorly. Thoracic tracheal folds distinct, with numerous minute dots on the mesal part, the combs with 3 short rounded stout teeth equal in length. Caudal furrow long, slender; the comb with teeth similar to those of the thoracic folds; many minute dots present in a group behind the vasiform orifice on the venter; lobed

area surrounding the orifice long, reaching the margin of the pupa case. Vasiform orifice much longer than wide, somewhat triangular, not well defined at the hind end, reticulated on the median area, rounded at the hind end, with 5 pairs of slender teeth, resembling that of *Bemisia*. Operculum a little wider than long, constricted basally, rounded on the hind margin, narrowing towards the hind margin, filling half the orifice. Lingula normal in shape, reaching beyond the apex of operculum, not extending to the hind end of the orifice, with a pair of long subapical bristles. Length of pupa case—about 1.3 mm.

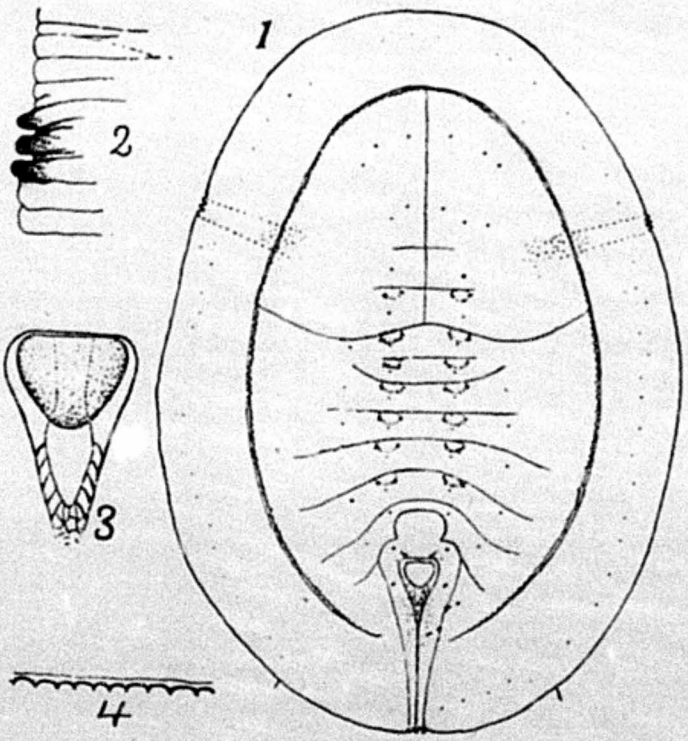


Fig. 22.
Aleurolobus citri n. sp.
(Pupa case)
1. Outline. 2. Thoracic tracheal comb and margin.
3. Vasiform orifice. 4. Margin of dorsal disk.

Host.—Citrus sp.

Hab.—Washoshu near Taihoku.

Described from specimens collected on Dec. 1, 1930. Related to *Aleurolobus flavus* Quaint. et Baker, but may be separated from it by the characters of vasiform orifice.

Aleyrodes kuchinasii Sasaki.

Trans. Ent. Soc. Japan, II, pt. 3, p. 55 (1908).

Host.—Gardenia florida, attacking the lower side of leaf.

Hab.—Taihoku, Hokuto.

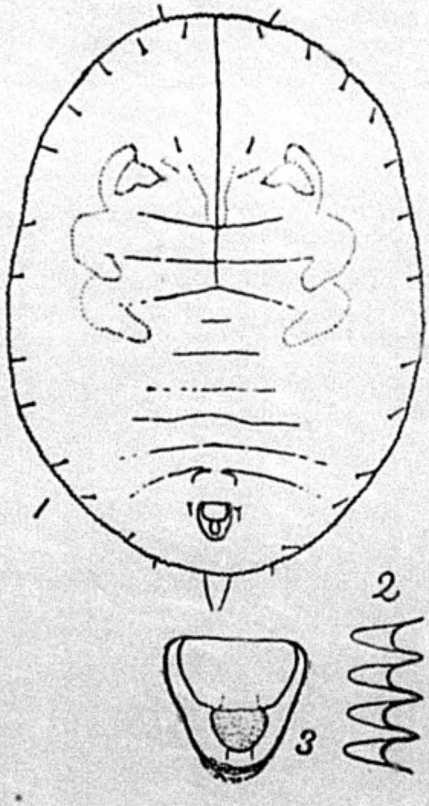


Fig. 23.
Aleyrodes kuchinasii Sasaki.
(Pupa case)
1. Outline. 2. Margin.
3. Vasiform orifice.

This species is allied to *Aleyrodes akebiae* Kuwana, but differs from it in the shorter submarginal setae of the pupa case not reaching beyond the margin. Sasaki briefly described the adult from Gardenia in Tokyo, Japan. The Formosan species is perhaps the same with the Japanese one, and I adopt here this name. Very common, producing indistinct galls on the leaves.

Aleyrodes cinnamomi n. sp.

(Pupa case) Pale grayish green, longitudinally pale yellowish brown on the median area of dorsum (in specimens on Machilus sometimes longitudinally blackish brown on the median area), with many short thin wax-filaments on the margin. Elliptic, broad, not constricted, flattened, with a small very shallow indentation at the hind end. Mid-thoracic and transverse sutures nearly reaching the margin; suture between the head and thorax eminent on the median area; abdominal segments faintly discernible on the median area. Dorsum with many minute circular pores sparsely scattered, many small reticulating markings except on the median and marginal areas, and many lines extending mesad from the margin; head with a pair of long dorsal bristles on the hind part; abdomen with a pair of similar ones on the base, a pair of short setae in front of the vasiform orifice, and a short seta laterad of the orifice; the bristles on the head and basal part of abdomen shorter than the marginal ones, sometimes absent. Marginal teeth arranged in 2 rows, equal in size, very small, nearly hemispherical, much wider than long, separated from each other in each row, often directed upwards; 32 very long bristles equal in length arranged in a row along the whole margin, each arising from a small tubercle which is distinctly constricted near the tip; a pair of short setae present on the hind margin. Thoracic tracheal folds and clefts not discernible; caudal furrow indistinct. Vasiform orifice small, nearly as long as or a little shorter than wide, thickened on the margin, rounded,

expanded on the front margin, with about 8 indistinct teeth and a small longitudinal thickened part on the hind part, with no notch. Operculum constricted basally, narrowing towards the hind margin which is straight or rounded, nearly filling the orifice. Lingula not exposed. Length of pupa case—about 1.45 mm.

Hosts. —Cinnamomum japonicum, Machilus sp., Phoebe formosana.

Hab.—Urai.

Described from material collected on Sept. 6, 1931. This species is peculiar in the characters of the marginal area and is not a typical one of the genus.

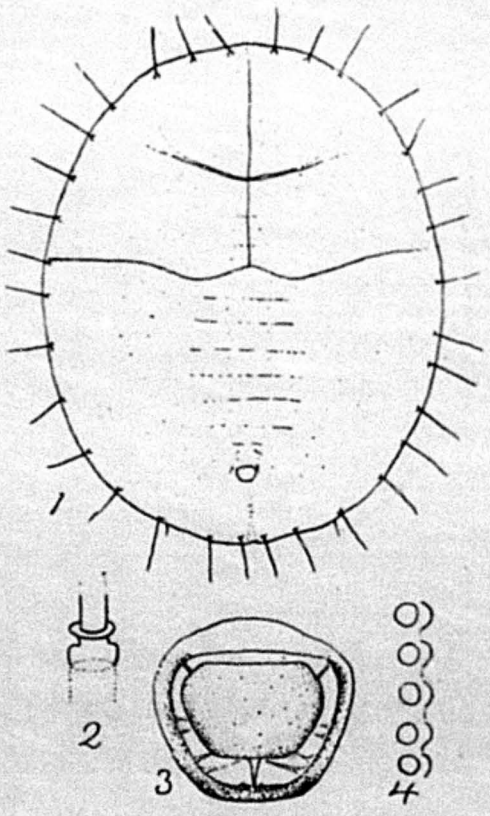


Fig. 24.
Aleyrodes cinnamomi n. sp.
(Pupa case)
1. Outline. 2. Basal part of marginal bristle.
3. Vasiform orifice. 4. Margin.

Aleyrodes liquidambari n. sp.

(Pupa case) Pale yellow, with no secretion evident. Elliptic, flattened. Mid-thoracic suture reaching the margin, transverse suture not distinct on the lateral parts, abdominal segments distinct on the median area. Dorsum granular except on the median area, with 8 pairs of long bristles as shown in the figure; abdominal segments 2-6 each with a pair of markings on the median area. Margin somewhat indented at the hind end, with many small teeth wider than long and rounded, and a pair of short setae on the anterior and posterior parts. Venter with a narrow marginal rim. Thoracic tracheal folds not discernible. Caudal furrow not well developed, a little widened anteriorly, with large, but indistinct markings nearly similar in shape to those of *Dialeurodes citrifolii*. Vasiform orifice wider than long, straight or rounded on the hind margin, with no teeth. Operculum straight on the hind margin, rounded on the lateral margins, wider than long, filling more than half the orifice. Lingula knobbed, reaching to or a little beyond the hind margin of the orifice, setose, without long setae. Length of pupa case—about 0.97mm.

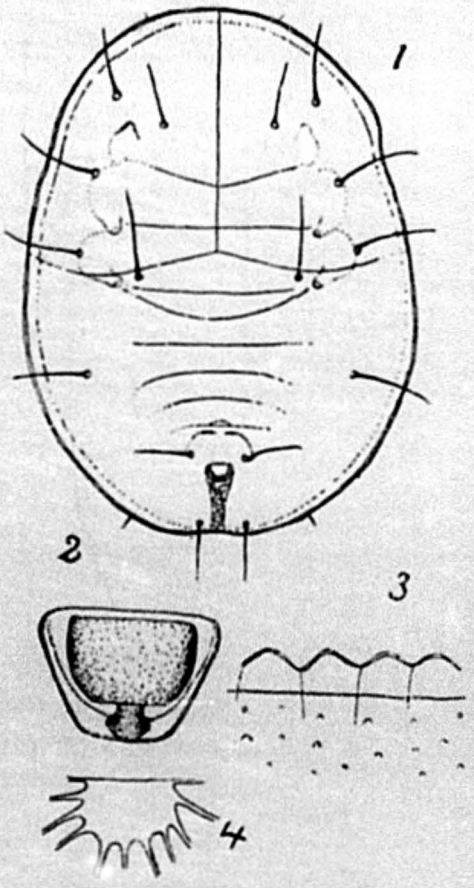


Fig. 25.
Aleyrodes liquidambari n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice. 3. Marginal teeth and dorsal granules. 4. Marking on median area of abdomen.

Host.—Liquidambar formosana.

Hab.—Taihoku.

Very common, making yellow patches on the leaves. Described from specimens collected on May 10, 1931. This species is not a typical form of the genus and is characterized by the structures of vasiform orifice, lingula and caudal furrow.

Trialeurodes mori n. sp.

Aleurodes sp., Shiraki, Agr. Expt. St. Formosa, Spec. Rept., no. 8. p. 109 (1913); Maki, Agr. Expt. St. Formosa, Pub., no. 90, p. 62 (1916).

(Pupa case) White, without secretion evident. Oval, very slightly narrowed anteriorly, flattened. Mid-thoracic and transverse sutures reaching the margin, abdominal segments distinct on the median area. Dorsum with many small circular pores densely scattered except on the median and marginal areas; marginal area with many papillae in about 3 irregular rows, which are rounded, as long as or shorter than wide, much larger than the dorsal pore, and directed inwards; about 14 pairs of rather short setae in a row along the whole margin; caphalothorax with 3 pairs of stout setae as shown in the figure and many small subcircular and oval markings on the median area; abdomen with a pair of short setae near the anterior margin of vasiform orifice and some median markings. Margin with many very small rounded teeth wider than long, a pair of short anterior setae, and a pair of very long posterior setae. Thoracic tracheal folds not discernible. Caudal furrow distinct, widened anteriorly, thickened on the margins of the basal part, with many large imbrications, not forming a pore nor indented at the posterior end. Vasiform orifice wider than long, somewhat rounded on the lateral margins, nearly straight or slightly indented on the hind margin, without teeth. Operculum much wider than,

subrectangular, filling half or more of the orifice. Lingula reaching to or a little beyond the hind margin of the orifice, distinctly and abrupt y knobbed, rounded apically, with a slight constriction near the base of the knobbed part, setose, without long setae. Length of pupa case—about 0.75 mm.

Hosts.—Morus alba, Salix sp.

Hab.—Taihoku, Kappan-zan.

Very common, at times occurring in abundance. This species is characterized by the submarginal papillae directed mesad. The dorsal setae are sometimes very short or absent.

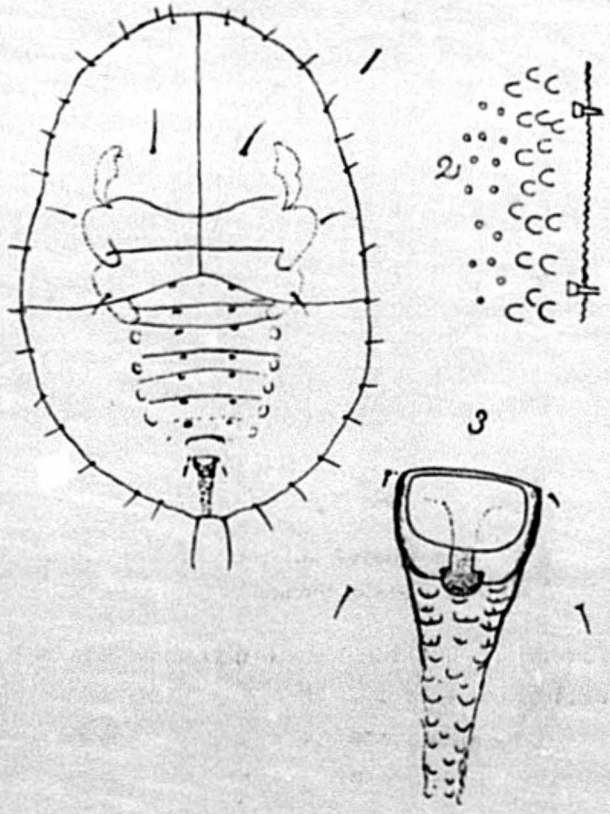


Fig. 26.
Trialeurodes mori n. sp.
(Pupa case)
1. Outline. 2. Margin and dorsal papillae and pores.
3. Vasiform orifice and caudal furrow.

Trialeurodes elatostemae n. sp.

(Pupa case) White, with no secretion evident. Broadly elliptic, somewhat narrowed on the anterior part, thin. Mid-thoracic and transverse sutures reaching the margin; abdominal segments distinct on the median area. Dorsum with some small circular pores or very short papillae sparsely scattered. 28 rather long setae each arising from a small tubercle arranged in a row along the whole margin, of which the posterior 2 are much longer, stouter, arising from larger very distinct tubercles; a pair of chitinized rounded small tubercles present between the last stout setae, the tubercles larger than the marginal teeth, separated from each other, wider than long; a pair of short setae present on the anterior and posterior margins. Marginal teeth as in *Bemisia myricae* Kuwana. Thoracic tracheal folds scarcely discernible, the clefts not distinct, with a broad tooth chitinized and about 8 oblong pores arranged in a row on the margin. Caudal furrow not distinct, with no comb. Vasiform orifice longer than

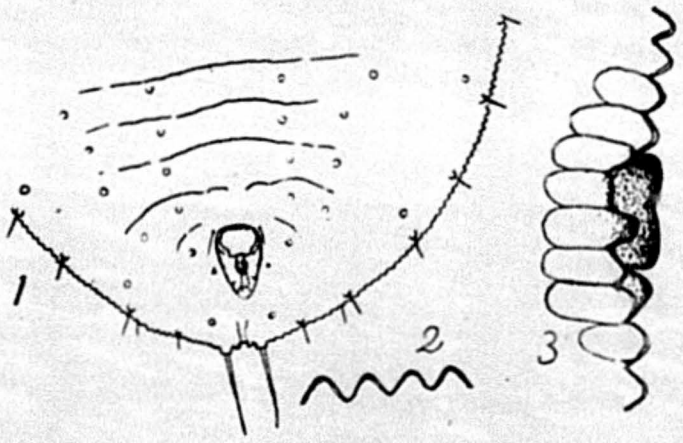


Fig. 27.
Trialeurodes elatostemae n. sp.
(Pupa case)
1. Posterior part of abdomen. 2. Margin. 3. Distal end of thoracic tracheal fold.

wide, rounded and not well defined at the distal part, with no distinct teeth. Operculum subrectangular, rounded on the lateral margins, straight on the hind margin, a little constricted at the distal part, nearly half filling the orifice. Lingula knobbed, not reaching the hind end of the orifice, somewhat pointed apically, with a pair of long apical bristles. Length of pupa case—about 0.55 mm. Width—about 0.42 mm. Length of lateral maginal seta—about 0.023mm.

Host.—Elatostema sp.

Hab.—Urai, Sozan.

Described from material taken on Sept. 6, 1931, at Urai. This species is characterized by the peculiar distal ends of thoracic tracheal folds.

Pealius celti n. sp.

(Pupa case) Allied to *Pealius misrae* Singh, but differs from the description and figures of Singh in the following characters:

(1) Abdominal segments each with a pair of markings on the median area.

(2) Vasiform orifice a little longer.

(3) Caudal furrow not defined posteriorly, imbricated.

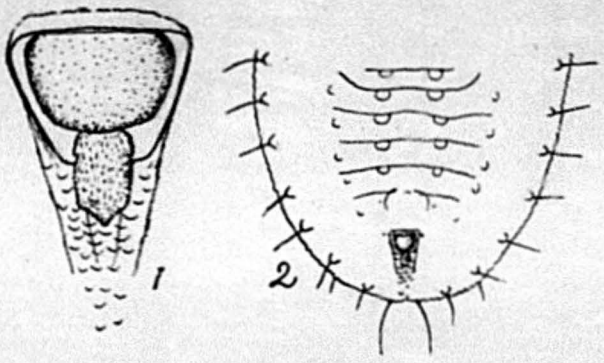


Fig. 28.
Pealius celti n. sp.
(Pupa case)
1. Vasiform orifice and caudal furrow.
2. Abdomen.

(4) Operculum broadly rounded on the hind margin.

(5) Lingula as shown in the figure in shape, with a slight constriction and a pair of long setae on the knobbed part.

Host.—Celtis sinensis.

Hab.—Taihoku.

A few specimens were collected on Aug. 7, 1931. The pupa case is provided with many small concaves on the submarginal area of the dorsum and is about 0.65 mm. in length. This species is not a typical form of the genus, but is now placed here.

Pealius longispinus n. sp.

(Pupa case) White, with no secretion evident. Oval, narrowed posteriorly, flat, not indented on the hind margin, but with some irregular shallow indentations on the margin. Mid-thoracic and transverse sutures distinct, nearly reaching the margin, abdominal segments distinct on the median area. Dorsum with a few small circular pores or very short papillae, and numerous small shallow concaves densely scattered on the submarginal area; cephalothorax with 5 pairs of very long bristles, and 4 rather short setae along the lateral margin; abdomen with 5 pairs of very long bristles, and 3 or 4 rather short setae along the lateral margin; each bristle and seta arising from a small, but distinct, tubercle; abdominal segments 1–6 each with a pair of small rounded markings on the median area. Margin with very short rounded teeth much wider than long, and a pair of short setae on the anterior and

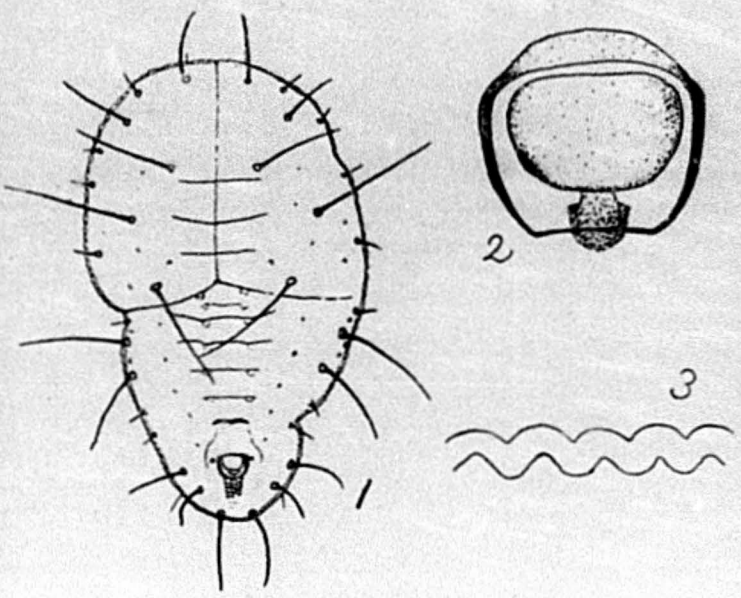


Fig. 29.
Pealius longispinus n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice. 3. Marginal teeth.

posterior portions. Thoracic tracheal folds not discernible. Caudal furrow distinct, but not reaching the margin, broad, somewhat widened towards the base, slightly thickened on the lateral margins, not well defined posteriorly, with reticulating markings. Vasiform orifice rather large, wider than long, nearly straight on the hind margin, thickened on the margin, lacking teeth. Operculum much wider than long, rounded on the lateral margins, Nearly straight on the hind margin, filling more than half the orifice. Lingula reaching beyond the hind margin of the orifice, knobbed, setose. Length of pupa case—about 0.6 mm.

Host.—Ficus beecheyana, attacking the lower side of leaf.

Hab.—Sozan.

Many empty cases were collected on June 21, 1931. Characterized by possessin g long dorsal bristles.

Aleurotrachelus elatostemae n. sp.

(Pupa case) Pale yellowish brown, with narrow secretion along the margin. Oval, rounded or slightly pointed at the anterior extremity, flattened, with a distinct median ridge on the cephalothorax, with no marginal rim. Transverse suture reaching the longitudinal folds, not much produced forwards; suture between the meso- and metathoraci eminent, but not reaching the longitudinal folds; abdominal segments distinct on the median area. Dorsum with 5 pairs of very long bristles, of which 3 pairs are on the cephalothorax, longer, subequal in length;

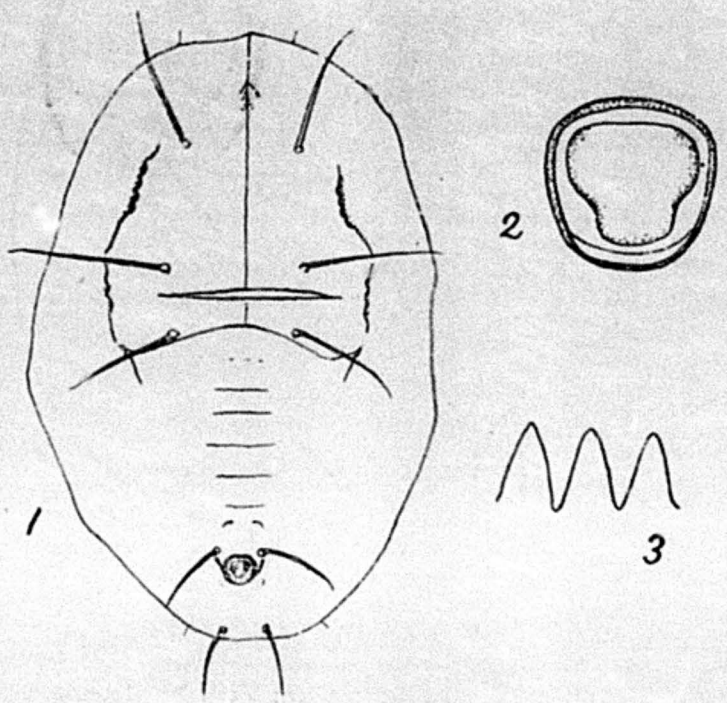


Fig. 30.
Aleurotrachelus elatostemae n. sp.
(Pupa case)
1. Outline. 2. Vasiform orifice. 3. Outer marginal teeth.

few very small circular pores present on the dorsum. Longitudinal folds distinct, with some small rounded tubercles. Thoracic tracheal folds not discernible. Marginal teeth in 2 rows difficult to differentiate; outer teeth much longer than wide, conical, more or less pointed at the tip; a pair of short setae present on the anterior and posterior margins. Vasiform orifice large, on a protuberance, rounded, thickened on the margin. Operculum nearly as long as wide, narrowed on the distal half, rounded on the hind margin, nearly filling the orifice. Length of pupa case—about 0.75-0.8mm.

Host.—Elatostema lineolatum, attacking the lower side of leaf.

Hab.—Taihezan.

Many pupa cases were obtained on May 20, 1931. Allied to *Aleurotrachelus longispinus* Corbett, but may be distinguished from it by the characters of the marginal teeth.

Aleurotrachelus micheliae
n. sp.

(Pupa case) Dirty pale brown. Subcircular, somewhat or scarcely pointed at the anterior extremity, very slightly narrowed on the cephalothorax, flattened, with a shallow median ridge on the cephalothorax and an indistinct marginal rim. Transverse suture reaching the longitudinal folds, produced forwards; suture between the meso-and metathoraci eminent, reaching the longitudinal folds; abdominal segments distinct. Dorsum with 4 pairs of long, very stout bristles not reaching the margin, and many small circular pores. Margin with 2 rows of teeth, outer teeth much longer than wide, rounded apically, nearly parallel on the sides, not expanded basally.

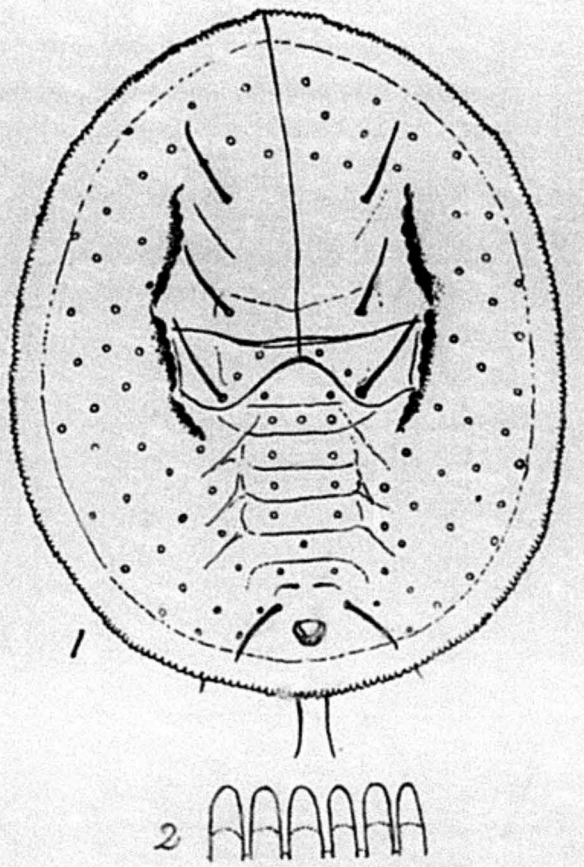


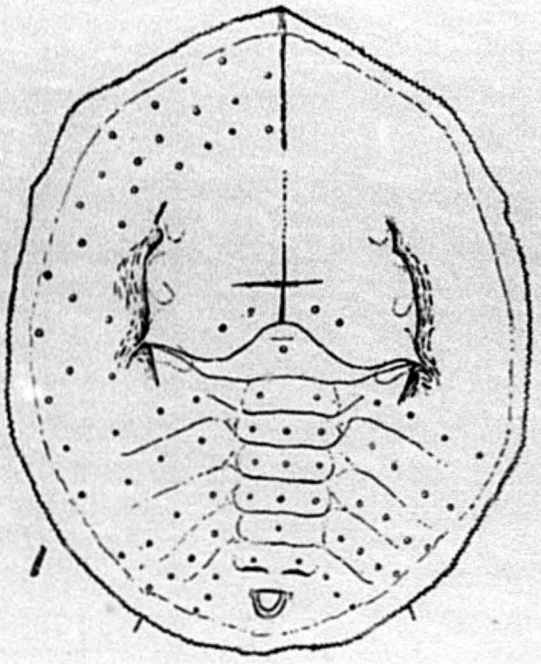
Fig. 31.
Aleurotrachelus micheliae n. sp.
(Pupa case)
1. Outline. 2. Marginal teeth.

A pair of very long posterior bristles and a pair of short latero-posterior setae present. Longituginal folds distinct, with small rounded tubercles. Thoracic tracheal folds not discernible. Vasiform orifice subcordate, slightly wider than long, similar in shape to *Aleurotrachelus caerulescens* Singh, thickened on the margin, with no median spine, but with about 4 small teeth on the side. Operculum nearly similar in sharp to the orifice, filling more than half the orifice. Lingula not visible. Length of pupa case—about 0.8 mm.

Host.—Michelia sp., attacking the lower side of leaf.

Hab.—Heito.

Many pupa cases parasitized by a Hymenopteron were collected on Nov. 16, 1930. Allied to *Aleurotrachelus caerulescens* Singh, differing in the shape of marginal teeth, in possessing dorsal bristles, and in the characters of thoracic longitudinal folds and vasiform orifice.



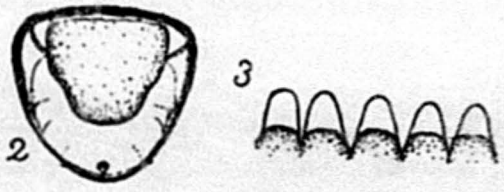


Fig. 32.
Aleurotrachelus caerulescens Singh.
(Pupa case)
1. Outline. 2. Vasiform orifice. 3. Margin.

Aleurotrachelus caerulescens Singh.

Mem. Dept. Agr. India, Ent. Ser., XII, p. 59 (1931).

Hosts.—Myrica rubra, Celtis sinensis, Gardenia florida, Salix sp., Lagerstroemia indica.

Hab.—Taihoku, Maruyama.

New to the fauna of Formosa. Very common. Allied to *A. camelliae* Kuwana, but differs from Kuwana's figures in possessing only a shorter median spine in the vasiform orifice.

Aleurotrachelus fissistigmae Takahashi.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 264 (1931).

Host.—Fissistigma oldhami.

Hab.—Shinten, Urai.

Aleurotrachelus turpiniae n. sp.

(Pupa case) Differs from *A. micheliae* Takah., to which this species is closely related, in the following characters:

(1) Smaller, about 0.65 mm. in length, about 0.47 mm. in width.

(2) Nearly broadly elliptic.

(3) Marginal teeth a little shorter.

(4) Dorsum lacking distinct circular pores, but with some minute ducts sparsely scattered; dorsal spines a little longer.

(5) Vasiform orifice without teeth.

Host.—Turpinia formosana.

Hab.—Urai.

A few specimens were taken on Sept. 6, 1931. Differs from *A. longispinus* Corbett in the longitudinal thoracic folds with many rounded tubercles directed inwards and in the vasiform orifice not located on a distinct ridge, and differs also from *A. elatostemae* Takah. in the outer marginal teeth rounded apically, in posessing more tubercles on the thoracic longitudinal folds, etc.

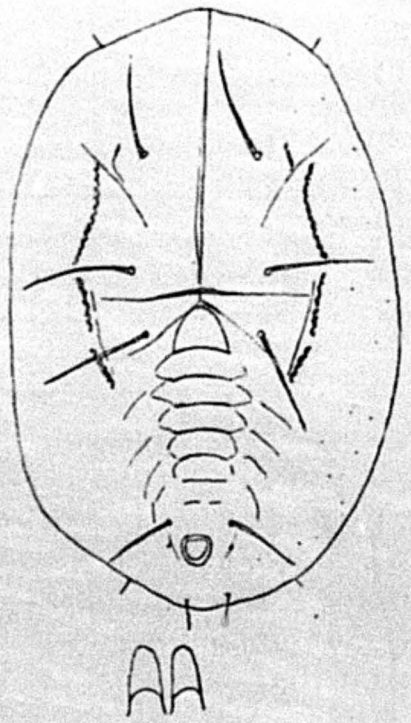


Fig. 33.
Aleurotrachelus turpiniae n. sp.
Pupa case
and marginal teeth.

Aleurotrachelus taiwanus n. sp.

(Pupa case) White. Oval, rounded on the anterior margin, narrowed on the posterior part, with an eminent median ridge on the cephalothorax, which is not reaching the anterior extremity of the case, and with a shallow blunt median ridge behind the vasiform orifice. Transverse suture produced forwards on the median part, pointed at the anterior end, not reaching the suture between the meso- and metathoraci; suture between the meso- and metathoraci eminent, not reaching the thoracic longiudinal folds; abdominal segments distinct as in *A. fissistigmae* Takah. Dorsum with 5 pairs of long stout bristles as in *A. fissistigmae* Takah., and with some minute circular pores arranged in a transverse row on the median area of each abdominal segment (3 pores in a row on the anterior 2 or 3 segments, but 4 on the remaining segments), which are absent on the marginal and submarginal areas. Thoracic longitudinal folds distinct, lacking tubercles; a pair of rather short oblique folds present in front of the longitudinal folds. Margin with

many short small teeth in 2 rows, the outer teeth nearly as long as or slightly longer than wide, rounded or sometimes slightly pointed apically, slightly narrowed towards the distal margin; the inner teeth distinctly discernible, very short, broadly rounded; a pair of rather long setae present on the anterior and posterior margins. Vasiform orifice large, a little longer than wide, somewhat narrowed posteriorly, on a distinct protuberance, rounded on the margin. Operculum nearly similar to the orifice in shape, nearly straight on the hind margin, filling most of the orifice. Lingula somewhat exposed. Length of pupa case—about 0.7 mm.

Host.—Pachyrrhizus erosus.

Hab.—Kusshaku near Shinten.

Collected on Nov. 22, 1931. Allied to *A. longispinus* Corbett, but differs in the characters of marginal teeth.

Neomaskellia bergii Signt.

Aleurodes bergii, Signoret, Ann. Soc. Ent. Fr., 4, VIII, p. 395 (1868); Zehntner, Meded. Proefst. Oost-Java, n. ser., no. 29, p. 3 (1896); van Deventer, Dierlijke Vijanden v. Suikerr. Hunne Parasit., p. 205 (1906); Kirkaldy, Board Comm. Agr. For., Hawaii, Div. Ent. Bull., 2, p. 48 (1907); Matsumura, Schaed. u. nuetz. Insekten Zuckerr. Formosas, p. 12 (1910).

Neomaskellia bergii, Quaintance and Baker, Proc. U. S. Nat. Mus., LI, p. 437 (1917); Corbett, Bull. Ent. Res., XVI, p. 278 (1926); Laing, Insects of Samoa, pt. II, Hem., Fasc. I, p. 45 (1927); Misra, Rept. Proc. 3rd Ent. Meet. Pusa, 1919, p. 427 (1920); Singh, Mem. Dept. Agr. India, Ent. Ser., XII, p. 17 (1931).

Host.—Saccharum officinarum.

Hab.—Koshun, Shinka.

Aleurocybotus setiferus Quaintance et Baker.

Proc. U. S. Nat. Mus., LI, p. 357 (1917); Corbett, Bull. Ent. Res., XV1, p. 274 (1926); Takahashi, Trans. Nat. Hist. Soc. Formosa, XXI, p. 207 (1931).

Host.—A plant of the Gramineae (Imperata ?).

Hab.—Taihoku.

Setaleyrodes mirabilis Takahashi.

Jl. Soc. Trop. Agric. Formosa, III, p. 222 (1931).

Host.—Ficus sp.

Hab.—Shikikun near Taihezan.

Aleurocanthus cinnamomi Takahashi.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 205 (1931).

Aleurodes spinosus, Shiraki (nec. Kuwana), Agr. Expt. St. Formosa, Spec. Rept. no. 8, p. 107 (1913); Maki (nec. Kuwana), Forest Expt. St. Formosa, Spec. Rept. no. 1, p. 31 (1915).

Hosts.—Cinnamomum camphora, Machilus spp.

Hab.—Taihoku, Shinten, Urai, Hokuto, Sozan, Shikikun near Taihezan, Kussha, Tosei, Heito, Tamari near Taito.

Aleurocanthus spiniferus Quaint.

Aleurodes spinifera, Quaintance, Can. Ent., XXXV, p. 63 (1903).

Aleurocanthus spiniferus, Quaintance and Baker, U. S. Dept. Agr. Bur. Ent. Tech. Ser., no. 27, pt. II, p. 102 (1914); Proc. U. S. Nat. Mus., LI, p. 351 (1917); Jl. Agr. Res., VI, p. 465 (1917); Misra, Rept. Proc. 3rd Ent. Meet. Pusa, 1919, p. 431 (1920); Corbett, Bull. Ent. Res., XVI, p. 275 (1926); Silvestri, Boll. Lab. Zool. Portici, XXI, p. 2 (1927); Kuwana, Minist. Agr. For., Dept. Agr., Sc. Bull., I, No. 1, p. 44 (1928); Kuwana and Ishii, Byokin Gaichu Iho, no. 18, p. 4 (1928); Kodama, Stud. on A. spiniferus, 38 pp. (1931).

Aleurodes marlatti, Shiraki (nec. Quaint.), Agr. Expt. St. Formosa, Spec. Rept., no. 8, p. 104 (1913); Maki, Forest Expt. St. Formosa, Spec. Rept., no. 1, p. 30 (1915).

Aleurocanthus rosae, Singh, Mem. Dept. Agr. India, Ent. Ser., XII, p. 70 (1931).

Hosts.—Citrus spp., Rosa sp., Salix warburgi, Sloanea dasycarpa, Fagara nitida, Liquidambar formosana.

Hab.—Taihoku, Washoshu, Mato, Hozan.

Very common on Citrus. *Aleurocanthus rosae* Singh is a synonym of this species.

Aleurocanthus spinosus Kuwana.

Aleurodes spinosus, Kuwana, Pomona Coll. Jl. Ent., III, p. 626 (1911).

Aleurocanthus spinosus, Quaintance and Baker, Proc. U. S. Nat. Mus., LI, p. 352 (1917); Takahashi, Trans. Nat. Hist. Soc. Formosa, XXI, p. 207 (1931).

Hosts.—Gardenia florida, Piper futokadsura, Citrus sp.

Hab.—Taihoku, Washoshu.

Common, but occurs in small numbers on Citrus.

Subfamily **Siphonaleyrodinae** new.

(Pupa case) Vasiform orifice, lingula and operculum entirely absent. Other major characters as in the subfamily Aleyrodinae.

This subfamily includes only one species and genus here described, and the adult form is not known.

Siphonaleyrodes n. genus.

(Pupa case) Elliptic, without papillae and ridges. Head faintly defined from the thorax; thorax well defined from the abdomen. Eye spots distinct. Submarginal area not separated from the dorsal disk, with many siphons. Margin chitinized, without teeth. Thoracic tracheal folds not discernible; thoracic tracheal pores or clefts absent. Caudal furrow, vasiform orifice, operculum and lingula entirely absent. Anus surrounded by a ring of pores. Legs rather large, but concealed under the body; coxae, femora and tibiae defined; tarsi rudimentary, with a minute claw.

Type—*Siphonaleyrodes formosanus* n. sp.

This genus is different from all other genera of the family in lacking vasiform orifice, operculum and lingula, but possessing many siphons on the submarginal area. It is possibly an intermediate form between the Aleyrodidae and Psyllidae and may represent one of the ancestral forms of the former family.

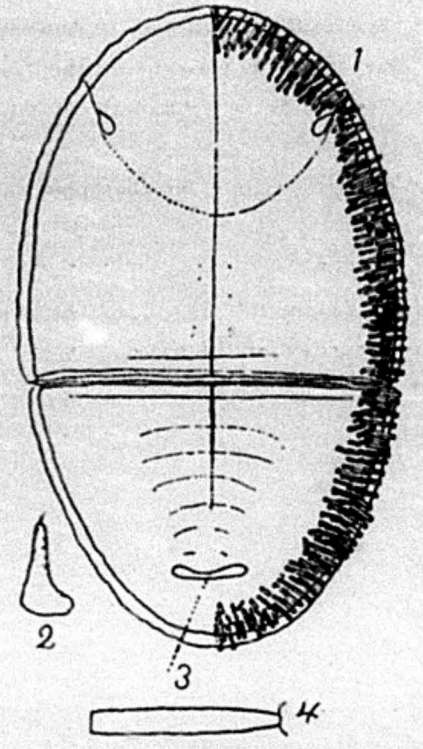


Fig. 34.
Siphonaleyrodes formosanus n. sp.
(Pupa case)
1. Outline (siphons on left half removed). 2. Antenna. 3. Ring of pores 4. Siphon.

Siphonaleyrodes formosanus n. sp.

(Pupa case) Black, covered with white secretion. Elliptic, elongate, about 1.9 times as long as wide, flattened, chitinized, without constrictions, ridges and papillae. Cephalothorax occupying more than half the case, with a median suture reaching the margin; thorax very faintly defined from the head; abdomen separated from the thorax, nearly straight on the basal margin, with an indistinct median suture on the basal half, abdominal segments faintly discernible on the median area. Dorsum lacking markings, but with numerous

short siphons densely scattered over the whole submarginal area; the siphons nearly cylindrical, somewhat narrowed on the basal part, straight, truncate at the tip, rather slender, some of which are reaching beyond the margin of the case, the mesal ones much shorter, the longer ones about 0.0185 mm. in length. Submarginal area not separated from the dorsal disk. Margin more chitinized (the chitinized part narrow and defined), with some small very shallow indentations, without teeth and setae. Thoracic tracheal folds and caudal furrow not discernible. Thoracic tracheal pores, vasiform orifice, operculum, and lingula entirely absent. Anal opening small, surrounded by about 90 small pores arranged side by side in a row and forming a transverse ring; the pores elliptic, in contact with each other, equal in size; a pair of very small circular indistinct pores present behind the ring. Legs rather large, robust, concealed; femora well defined from the large coxae and the tibiae, somewhat smaller than the coxae, wider than long; tibiae narrowing towards the distal part, longer than wide, much longer than the femora; tarsi rudimentary, with a minut conical claw, a long bristle and 2 very small flattened hairs. Antennae short, much expanded basally, not segmented, near the front margin of the case, projecting forwards, with a short apical seta. Eye spots distinct. Length of pupa case—about 0.75–0.8 mm.

Host.—Cinnamomum reticulatum, producing shallow swellings on the upper side of leaf.

Hab.—Garanbi near Koshun.

Some specimens were collected by Mr. K. Kobayashi on July 31, 1931. The pupa cases are found in small loose clusters on the lower surface of the leaves.

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臺灣産粉虱科ニ關スル研究(一)

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摘要

粉虱科ハ半翅目、同翅亞目ニ屬スル昆蟲ニシテ、種々ナル植物殊ニ樹木ノ葉ニ寄生シ、次ノ如キ害ヲ之ニ加フ。

(1) 吻狀ノ口ニテ葉ノ液ヲ吸收シ樹勢ヲ衰ヘシム、葉ヲ變色セシメ或ハ枯死ニ至ラシムルコトアリ、又稀ニ葉ヲ捲縮セシメ或ハ蟲瘤ヲ生セシム。

(2) 液狀ノ糞ヲ排泄シ、此糞ハ植物ノ表面ニ附着シテ煤病ヲ發生セシメ、植物ノ機能ヲ害スルノミナラス、其外觀ヲ損ス。

(3) 植物ノ「モザイツク」病ノ病原ヲ傳播スルコトアリ(Kirkpatrick氏ニヨル)。

幼蟲ハ葉ニ密着シ、蛹ノ時代ヲ經テ成蟲トナル、蛹ハ幼蟲皮ノ中ニ留リ、成蟲ハ4枚ノ翅ヲ有シテ飛行シ又跳躍スルコトヲ得。

粉虱類ハ既ニ說明シタルカ如ク、有害ナル昆蟲ナレトモ、其體ハ甚シク微小ニシテ發見セラレ難ク、又其幼蟲ハ外見介殼蟲ニ類似シテ一般ニ之ト見誤ラレ、其研究ハ臺灣其他東洋諸國ニテハ甚タ閑却セラレタリ。

此昆蟲ハ元來熱帶的ノモノニシテ、本島ニハ多數ノ種ヲ產スレトモ、余カ此調査ヲ開始スルマテハ、其研究甚タ不完全ニシテ、本島ヨリ種名ノ判明セルモノ唯4種記錄セラレタルニ過キサリキ。

本報告ハ本島產粉虱科ニ關スル基礎的研究ノ第一報ニシテ、主トシテ北部地方ニ產スル60種及其加害植物等ヲ記述セリ。是等ノ種ノ中應用上特ニ注目スヘキモノヲ簡單ニ說明スレハ次ノ如シ。

(1) みかんこなじらみ Dialeurodes citri Ashmead.

本島ノ柑橘ニ甚タ普通ナリ、雜食性ニシテ、柑橘ノ他ニ、くちなし、もくたちばな、しようべんのき、ほざきさるのを、たぶのき、あかぎ、かんこのき等、葉ノ表面ノ滑ナル植物ニ寄生ス。北米「フロリダ」ニ於テハ柑橘ノ大害蟲トシテ知ラル。幼蟲ハ扁平ニシテ、太ク、殆ト白色ニシテ、體背ニ著明ナル毛ヲ有セス。

(2) みかんとけこなじらみ Aleurocanthus spiniferus Quaintance.

柑橘ニ甚タ普通ニシテ、大害殖ヲナスコトアリ。ばらやなぎ、てりばざんせう等ニモ寄生シ、柑橘特有ノ害蟲ニハ非ス。鹿兒島縣ニテハ柑橘ニ大害アリト云ハル。體ハ黑色ニシテ、其周圍ニ白色ノ蠟質物ヲ有

シ、體背ニハ先端ノ尖レル多數ノ刺ヲ有ス。本島ニテハ從來まーらつとこなじらみトシテ記錄セラレタリ。

(3) くちなしとけこなじらみ Aleurocanthus spinosus Kuwana.

柑橘ニ寄生スレトモ少ク、くちなし及ふうとうかつらニ甚タ多シ。幼蟲ハ黑褐色或ハ黃褐色ヲ呈シ、體背ニ先端ノ少シク分枝セル多數ノ刺ヲ有ス。本島固有ノ種ナリ。

(4) くすとけこなじらみ Aleurocanthus cinnamomi Takahashi.

樟ニ加害シ又たぶのきニ生活ス。外見甚シクみかんとけこなじらみニ類似ス。未タ本島以外ニ發見セラレタルコトナシ。

(5) ひめこなじらみ Bemisia giffardi Kotinsky.

柑橘ニ寄生ス。體ハ細長クシテ、白色或ハ淡黃色ヲ帶ビ、背面ニ1對ノ縱條ヲ有ス。

(6) やまももこなじらみ Bemisia myricae Kuwana.

本島ニテハばんざくろ、たぶのき、せんりよう等ニ寄生シ、重要ナル害蟲ニ非サレトモ、日本ノ本土ニ於テハ桑ノ大害蟲トシテ知ラレ、又柑橘及やまもも等ニモ加害スト云フ。體ハ扁平ニシテ、橢圓形ヲ呈シ、白色、體ノ周圍ニ毛ヲ一列ス。

(7) たいわんくわこなじらみ Trialeurodes mori Takahashi.

桑ニ甚タ多ク、本島ニ於ケル桑ノ主要害蟲ノ一ナリ。柳ニモ寄生シ、桑固有ノ種ニハ非ス。體ハ扁平ニシテ、太ク殆ト白色ナリ。

(8) さとうきびこなじらみ Neomaskellia bergii Signoret.

甘蔗ニ加害シ、本島北部ニテハ未タ發見セラレタルコトナシ。體ハ細長シ。

(9) まーらつとこなじらみ Aleurolobus marlatti Quaintance.

柑橘ニ加害ス。體ハ扁平ニシテ黑色、體背ニハ明ナル刺毛ヲ缺ク。

是等ノ種ノ他ニ尙栽培植物ニ寄生スルモノ少カラサレトモ現在甚タ重要ナル害蟲ニハ非サルヲ以テ其說明ヲ省略ス。

粉虱類ノ大部分ハ甚タ雜食性ナルヲ以テ、現在野生植物ニノミ寄生スルモノモ今後栽培植物ニ加害スルニ至ルコトアルヘシ。

驅除豫防法

(1) 日本ノ本土、支那及南洋諸國等ニハ未タ本島ニ發見セラレサル有害ナル種ヲ產ス。例ヘハ印度及南洋ニテ甘蔗ニ加害スル Aleurolobus barodensis Maskell ノ如キ、又支那及南洋ニテ柑橘ニ加害スル Aleurocanthus citriperdus Quaintance et Baker 及 A. woglumi Ashmead 等ノ如キハ未タ本島ニ發見セラレス。

是等昆蟲ハ苗木等ニ寄生シテ運搬セラルルコト多キヲ以テ、其本島

ニ侵入スルヲ防止セサルヘカラス。

(2) 苗木ノ植附又ハ運搬ニ際シテハ無被害ナルモノヲ選擇スヘク、被害ヲ認ムル時ハ青酸瓦斯ニテ燻蒸シ或ハ藥劑ヲ撒布シテ驅除スルヲ可トス。

(3) 被害樹ニハ松脂合劑(約20倍)或ハ機械油乳劑(約25倍)ヲ撒布スヘシ。余ハ是等藥劑ニテ實驗ヲ行ヒみかんこなじらみ、くちなしこなじらみ及ひめこなじらみヲ驅除スルコトヲ得タリ。

(4) 藥劑ハ被害樹ノ新芽ヲ出ス以前ニ撒布スルヲ可トス。何トナレハ、新葉ヲ出ス時ハ害蟲ハ之ニ移行蕃殖シ、又新葉ハ藥害ヲ被リ易キヲ以テナリ。

(5) 粉虱類ノ大部分ハ雜食性ニシテ、例ヘハ既ニ記述セル如クみかんこなじらみ及みかんとけこなじらみハ柑橘ノミナラス他ノ種々ナル植物ニ寄生シ、又くすとけこなじらみハ樟ノミナラスたぶのきニモ生活ス。從テ驅除ヲ行フニ際シテハ栽培植物ノミナラス他ノ全テノ食草ニ寄生スルモノヲモ驅除スルヲ要ス。

INDEX

PAGE

Acanthaleyrodes
callicarpae Takah. 20

Aleurocanthus
cinnamomi Takah. 47
rosae Singh.... 47
spiniferus Quaint. 47
spinosus Kuw. 47

Aleuroclava 20

Aleurocybotus
setiferus Quaint. et Baker. ... 46

Aleurodicus
formosanus Takah. 7
machili Takah. 7

Aleurolobus
citri Takah. 34
marlatti Quaint. 34
oplismeni Takah. 33
philippinensis Quaint. et Baker. 34
setigerus Quaint. et Baker. ... 33

Aleuroplatus
fici Takah. 31
pectiniferus Quaint. et Baker.... 30

Aleurotrachelus
caerulescens Singh. 44
elatostemae Takah. 42
fissistigmae Takah. 44
micheliae Takah.... 43
murrayae Singh. 20
psidii Singh. 24
taiwanus Takah. 45
turpiniae Takah. 45

PAGE

Aleurotuberculatus
elatostemae Takah. 23
ficicola Takah. 24
gordoniae Takah. 21
guyavae Takah. 22
jasmini Takah. 26
malloti Takah. 25
psidii Singh. 24
uraianus Takah. 27

Aleyrodes (Aleurodes)
akebiae Kuw. 36
bergii Signt. 46
citri Ashm. 8
cinnamomi Takah. 36
euryae Kuw. 29
hibisci Kotin. 14
kuchinasii Sasaki. 35
liquidambari Takah. 37
marlatti Quaint. 34
spiniferus Quaint. 47
spinosus Kuw. 47

Bemisia
aceri Takah.... 33
achyranthes Singh. 33
giffardi Kotin. 32
gossypiperda Misra et Lamba.... 33
myricae Kuw. 32
pongamiae Takah. 32

Dialeurodes
citri Ashm. 8
daphniphylli Takah. 10
decempuncta Singh. 14
fletcheri Singh. 14

PAGE

tuberculatus Takah. 9

——— (Dialeuroplata)

bladhiae Takah. 14

——— (Dialeuropora)

brideliae Takah. 15

murrayae Takah. 15

setigerus Takah. 14

——— (Gigaleurodes)

cinnamomi Takah. 13

lithocarpi Takah. 13

multipori Takah.... 11

——— (Rachisphora)

fici Takah. 19

machili Takah. 16

maesae Takah. 18

——— (Singhius)

hibisci Kotin. 14

Dialeuroplata

bladhiae Takah. 14

Dialeuropora

brideliae Takah. 15

murrayae Takah.... 15

setigerus Takah. 14

Gigaleurodes

cinnamomi Takah. 13

lithocarpi Takah.... 13

PAGE

multipori Takah.... 11

Neomaskellia

bergii Signt. 46

Pealius

celti Takah. 40

longispinus Takah. 41

Pseudaleurolobus 20

Rachisphora

fici Takah. 19

machili Takah. 16

maesae Takah. 18

Setaleyrodes

mirabilis Takah. 46

Singhius

hibisci Kotin. 14

Siphonaleyrodes

formosanus Takah. 48

Taiwanaleyrodes

meliosmae Takah. 28

Tetraleurodes

aucubae Kuw. 20

Trialeurodes

elatostemae Takah. 39

mori Takah.... 38

Tuberaleyrodes

machili Takah. 29